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40p
24-30 May 1984 Vol 3 No 21

New weekly QL page

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STAR GAME
Fruity on Commodore 64
See page 10

News Desk

Music for your ears

CASIO has produced an interface to allow its Casiotone MT-200 electronic music keyboard to be connected to micros

The Casio Interface PA 1 will connect the keyboard to any computer which has either a Centronics interface built-in — or can be connected to one

The MT-200 is a 49-key four-octave unit which costs £129 It has eight pre-set voice types — piano, clarinet, strings etc — and six rhythms

Using the interface unit any micro — such as the Spectrum with a Centronics interface — can be used to store and play notes to the keyboard

The keyboard is instructed from Basic with the sequence of notes to be played stored in the form of a Basic string

continued on page 5

MSX invasion plans go ahead

PLANS for the invasion of the Japanese MSX compluter are now sufficiently far advanced that the system has been formally unveiled to the press

All of the major Japanese electronics companies have joined forces to produce micros with broadly the same hardware which will all run the same software — the so called MSX design standard Each of the machines uses a Z80 processor with a 32K ROM including Microsoft Basic and at least 8K RAM All use the same TI video chip giving a 40 x 24 text display (256 x 192 graphics resolution) with 16 colours available All use the same GI three-channel sound chip Where a disc unit is available as an option it is Microsoft MS DOS compatible

MSX machines have been on sale in Japan since last October and the first MSX micros to appear in this country will go on sale at a "competitive price" in the early Autumn

Micros from eight Japanese manufacturers — Sony Sanyo Tshiba Teleton, JVC Mitsubishi Hitachi and Canon — are expected to be in the shops by Christmas, backed by retail chains like Boots and Laskeys Two other manufacturers, Yamaha and National Panasonic — both which have been successful with MSX in Japan — have still to decide whether to tackle the UK market

By the time the first machines go on sale in September, several hundred British software packages will have been written for MSX Over ninety per cent of the material will be games software Among the companies writing for MSX are Psion, Quicksilva, Virgin Melbourne House, Thorn EMI, Silversoft and Hewson Other companies which have shown interest in

continued on page 5

This Week

● **Special Feature** *Ray Berry looks at the history of the micro-processor on page 12* ● **Networking** *David Lawrence surveys the equipment needed to get going See page 19* ● **Spectrum** *M Sheffield presents a pixel by pixel movement program on page 22* ● **QL** *An introductory guide for owners — and aspiring owners — by John Cochrane on page 28* ● **New Releases** *This week s software includes* Sheep in Space *from Llamasoft and* Contract Bridge *from Touchstone Page 52*



Moving up now to dock with the user port

CURRAH µSLOT

Expandable Motherboard System for ZX Spectrum

Have you ever plugged a brand new peripheral into your Spectrum and then found you couldn't plug anything else in?

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Moulded in black plastic, **µSLOT** is styled to complement your Spectrum and its accessories. It comes in its own distinctive packaging complete with full instructions for use.

ZX Spectrum, ZX Interface 1 and ZX Interface 2 are trademarks of Sinclair Research Ltd.

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Please allow 28 days for delivery



24-30 May 1984 Vol 3 No 21

SUNSHINE

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How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long The articles, and any accompanying programs, should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work.

This Week



News 5
Casio
Letters 7
Copyright
Star Game 10
Fruity for Commodore 64 by Lee Tanner
Special Feature
Microprocessors by Ray Berry
Reviews 14
In-depth software analysis
Networking 19
David Lawrence looks at the equipment needed to get started
Spectrum 22
Pixel by pixel movement by M Sheffield
QL 28
John Cochrane takes a user's-eye view of the QL
Commodore 64 32
Resequence text file by Adrian Warman
Open Forum 35
Four pages of your programs
Microradio 39
Ray Berry s column
Arcade Avenue 40
Tony Kendle s arcade check out
Adventure 43
Tony Bridge s corner
Peek and Poke 45
Your questions answered
New releases 52
Latest software programs
This week 54
Top 10 plus all the week's software
Competitions 55
Ziggurat, Puzzle Hackers

Editorial

Networking is becoming increasingly popular. More and more micro owners are buying modems and linking themselves up to a range of free bulletin boards and commercial systems such as Prestel and Micronet 800.

Admittedly, the overall number of home networkers is still relatively small, but the total is growing all the time

But, while networking is a comparatively new phenomenon for home micro users, it is not new to business users. A range of companies including Reuters, Datastream and Telerate, have been providing electronic news and market report services for years

Now Merrill Lynch, a New York securities company, has joined forces with IBM to launch International Market Net – a firm designed to challenge existing network information providers

There are also increasing attempts to attract micro users to home banking schemes such as Homelink while Commodore has set up Compunet a pilot network which could rival Micronet WH Smith plans to launch its own Games Network in early 1984 (see *PCW* 26 April – 2 May)

Printers and disc drives are the two peripherals most commonly bought once a user has set up a basic system of micro, tv and tape recorder. Modems may soon become the third most sought-after item

Next Thursday

Next week's star game is Air Sea Battle for 16/48K Spectrum by Gary Burrows — a strategy game in which you must protect your oil rigs



And why not?
It has the finest graphics yet to emerge from a Spectrum game.
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MSX

continued from page 1

MSX include flug-byte, Bubble Bus, Kuma, Aligata, Micromega, Ocean and Ultimate

The first MSX machines will



be previewed at the CETEX trade show at Earl's Court later this month

The MSX standard is a controversial one Several prominent software houses have expressed disappointment that the giant Japanese manufacturers have chosen to base their home computer standerd on the now somewhat elderly Z80 processor Commented Psion's David Potter at the MSX launch "Any standard has advantages and disadvantages MSX will provide a common environment for software development and the consumer will benefit from the wide range of peripherals available for it

"The disadvantage is that it could inhibit change Innovation in the decade to come will be considerable and the question remains whether the MSX is sufficiently and openmindedly designed to allow it to become a standard for many years to come"

Microsoft Japan's Kay Nishi — the man who originally conceived the idea of the 8-bit MSX standard — admitted that on standard can last for ever He said "I don't deny that 16-bit is coming — but not this year, or in the next two years Whatever happens, MSX will be upwardly compatible"

Casio

continued from page 1

The string is then executed by the keyboard with an *LPrint* command

From Basic it is possible to set the pitch, duration and voice of any note and control the type of rhythm played by the keyboard It is also possible to transmit multi-voice data and mix and transpose tunes

The micro can be used as a kind of sequencer building up note or rhythm patterns over which it is then possible to play a further melody using the Casio keyboard directly

The PA-1 Centronics interface costs £29 50 and comes complete with a 48-page manual which includes a program listing for a Basic music editor

Rallying round

ATARI is to convert ist top-selling game *Pole Position* for the Spectrum, BBC and Commodore 64 computers

The new titles should be available shortly and are priced at £14 99 for the Spectrum and BBC versions on cassette £14 99 for the Commodore 64 version on cartridge

Sinclair car underway

SINCLAIR Vehicles — the company set up in February this year by Sir Clive Sinclair to produce a range of battery driven cars—has abandoned its option to buy the former deLorean car plant in Northern Ireland

Development of the first product—a low-cost town runabout—is now at an advanced stage and preproduction is scheduled to commence under licence at the Hoover plant in South Wales later this year.

Production prototypes have already been constructed and are under test Sinclair Vehicles hopes to launch the town car in the UK in the first quarter of 1985

Eight leave Commodore

EIGHT high level employees at Commodore International have left the company in the past three weeks and another 12 seem likely to go Major staff changes were widely expected after Marshall Smith took over as president in January, after the surprise departure of Commodore's founder Jack Tramiel.

Commodore itself will not comment on whether the senior executives — four of them vice presidents — resigned or were fired

The vice presidents who have left are Berhard Witter (finance), Greg Pratt (manufacturing and assembly), Taro Tokai (in charge of the Japan unit) and Lloyd Taylor (technology)

Also among those lost to the company are Jack Tramiel's son Sam, and John Feagans, director of software technology The latter plans to start up a software company with another Tramiel son.

Marshall Smith commented that the departures were part of "internal restructuring" and that the organisation has been streamlined as a result

3D adventure

CONTINUING its hallmark of 3D games, Hewson Consultants is presently working on a 3D adventure for the Spectrum

The game will be entirely graphic with the main character, a wizard, being controlled and moved by use of a keyboard or joystick The only text input will be to enlist the aid of other characters who will then appear on the screen

Programmer Steve Turner

"The finished game should contain about 255 locations, with up to 250 objects to pick up along the way," said Hewson programmer Steve Turner

The game, as yet untitled, has a target date for completion of September 1.

Hares and hounds

THOSE who didn't know where to look for the golden hare in Kit Williams's *Masquerade* will have another chance when the computer game *Hare Raiser* is brought out

When it was first published, the book *Masquerade* sparked off a national treasure hunt — it contained cryptic clues to lead the readers to a buried prize of a jewelled hare ornament

Now the treasure hunt winner, Ken Thomas, has sold the hare he won to Jeff Pennell, who in turn has set up the company Haresoft to promote a computer game based on a new quest

"*Hare Raiser* will be an adventure puzzle, sold in two parts," said Jeff "The first part will be available at the end of June and the second twelve weeks later Both parts of the puzzle will be needed to complete it."

The first person to send in a correct solution — the name of a secret location — plus two registration numbers that come the game will have a choice of either the hare or £25,000 as a prize

Hare Raiser will initially be available by mail order on the expanded Vic 20, Commodore 64, Dragon 32 and 64, Atmos Spectrum and BBC micros An Amstrad version is expected later Each part of the game will cost £8 95

Prism move

HAVING lost its exclusive right to distribute Sinclair products earlier in the year, Prism has now been appointed main distributor for Oric

Letters

Still waiting

Some Microdrive and QL potential customers may be interested in the progress of Sinclair's other little wonder — the Flat Screen Pocket tv.

I placed my order when the set was first announced in October 1983 intending the tv as a Christmas present for my son. Having been previously a purchaser of ZX81/Printer/Spectrum/Microdrive — all when first announced — I should have known better.

On the 15th November I received a letter to acknowledge my order — a cheerful missive full of stock phrases like please rest assured — no firm delivery date set — just as soon as etc and concluding with 'You'll hear from us again in January.

However the next letter came on 22nd December and apologised for the slow build up of production which meant that they would not be able to deliver my tv until January and ended with — "please accept our Best Wishes for a Happy Christmas and prosperous 1984 — complete with pocket tv".

I next heard from Sinclair on 6th February this year when I received a form requesting payment as delivery was imminent. This I confirmed with a cheque by return of post and received an acknowledgement on 26th February which said I could expect delivery by the end of March.

The next letter was dated 29th March and informed me that production was still slow to build up and my tv would not be delivered until April. The good news was that my cheque had not yet been encashed which was small comfort as it had been a Building Society cheque which had of course been debited from my account on drawing.

On the 18th April I telephoned 0276 62111 to enquire when delivery was likely and a charming young lady assured me that my tv would be despatched by the end of the month. Today is May 2nd and as nothing has yet materialised I telephoned again only to be told by another and equally charming young lady that despatch should be within 10 to 14 days.

Seven months wait is well in excess of the time it took to get either my Spectrum or Microdrive, but I are very patient and intend to keep on at them until I get my tv.

However, if it should turn out to be faulty I think I may take the trouble to drive down to Cambridge and insist that Uncle Clive eats it — in a sandwich with all those bloody letters!

Yours in hope,

John C Priest
53 Gaskell Crescent
Thornton-Cleveleys
Blackpool, Lancashire

PS Would anyone care to hazard a guess on the waiting period for the battery driven car when it is announced?

Radiated interference

In *PCW*, May 3 your correspondent D McRiner reported a 'strange anomaly' regarding the loading of tapes on his ZX Spectrum.

From his description, this would appear to be a straightforward case of electromagnetic interference (EMI). Nearly all electronic devices which incorporate circuitry for generating pulses (such as TV sets and computers) will generate EMI to a greater or lesser extent.

There are two ways in which this EMI can affect other equipment. One is via any interconnecting cabling, eg, if one or more pieces of equipment are connected to the same power supply. This is known as conducted interference. The other way is 'through the air' so to speak. In other words the offending equipment radiates EMI which, under the right circumstances, can cause a voltage to be induced in a second piece of equipment which in turn, can cause it to malfunction. This is known as radiated interference. This would seem to be the case with D McRiner's experience.

While there is not, as far as I know, any legislation governing levels of EMI from television sets both the USA and West Germany have published standards, enforceable in law concerning EMI from computers. It is widely believed that the EEC will introduce legislation, possibly within the next year or so, which will force UK manufacturers to drastically reduce levels of EMI from computers and computerised equipment.

J McQuillan
Flat 3
24 Priory Road
Great Malvern
Worcs

"Is there a sell by date on this standard?"

Legal insurance

I wish to clarify a number of points in the article by Gail Counsell (*PCW*, May 10) concerning the service offered by The Software Registry.

It was stated that the legal expenses insurance excludes interloquttary (sic) actions. The precise exclusion is "ex parte legal proceedings". It was strongly implied that the insurance excludes actions in which defendants claim authorship of an allegedly infringing program. The precise exclusion is of disputes concerning "proprietorship of the *insured* copyright". Insured-copyright is defined in the policy in terms of copyright subsisting in an item registered with the Software Registry. The obligation of a claimant to submit a legal opinion, to which Ms Counsell takes such exception, is a standard clause of legal expenses insurance and is not unique to our policy.

The allegation that our brochure avoids saying that registration does not give any added legal protection as such is wholly incorrect. The brochure contains several very clearly worded statements to the effect that we are not granting legal rights but are attempting to maximise the benefits of current legislation. Other publications including a leading national newspaper have remarked upon the candid way in which our brochure deals with this and other points. Our documentation contains no inaccurate or misleading statements and potential clients are specifically requested to read all of the small print.

The Software Registry is a consortium of 32 practising intellectual property specialists. Prior to launch, our service was thoroughly vetted by further specialist lawyers including an eminent barrister experienced in software piracy litigation.

A number of software houses and computer industry organisations have publically welcomed out initiative in establishing this service.

It is unrealistic to expect a solicitor to prepare and execute an Affidavit for less than £23 (including VAT) and the average cost of an interlocutory action is likely to be nearer £5,000 than £15,000, with some interlocutary actions costing significantly less. It is possible to arrange cover for Anton Pillare (sic) orders but the premium is many times our registration fee.

The value of our legal expenses insurance is that it provides confidence to initiate relatively inexpensive interlocutory proceedings with financial backing should one thereby become embroiled in a full trial where costs of £100 000 are all too possible.

Personally I would not like to enter a software copyright legal battle armed only with an unopened registered envelope.

C M Sturt
Director
The Software Registry
60 Lincoln's Inn Fields
London WC2



We've just won an award for blowing



Fruity

Stay healthy with a fruit eating game for the Commodore 64 from Lee Tanner (mind the mushrooms though — they're not so nice)

This is *fruity* for the Commodore 64 with Simons' Basic and joystick

The game is set in an enchanted garden. You must control a spider to eat all the fruit which is scattered amongst the mushrooms

Further instructions on play are included in the program

There are ten levels of Play — Level 10 the hardest. After each screen is completed the program automatically moves on to the next level but you have the option to start at any level by using f1 before any new game starts

Program Notes

10-49	Main loop to move spider
50-59	Increment score
90-93	Sound effect
100-299	Set up variables and set field
300-360	Next level
400-470	Lose a life
500-680	End game and ask for another
1000-1050	Place mushrooms on screen
1300-1550	Place fruit on screen
2000-2090	Draw screen
3000-4030	Title and set starting level
5000-5370	Instructions.
10000-11000	Define graphics.

```
5 GOTO100
9
10 PROC MOVE
12 VOL 15 WAVE 1,00100000 ENVELOPE 1,0,7,0,0
14 PRINT AT(14,0) "[illegible]" 1 MUSIC 10 "[illegible]" PLAY 1
15 F=INT(RND(1)*5)+70 IFF(F-70)=0THEN15
16 POKESP+500,F POKECC+500 FC(F-70) EXEC BLIP
18 FORZ=1TOF1
20 JS=JOY IFJS=0THEN30
22 IFJS=1THENWD=64
24 IFJS=5THENWD=65
26 IFJS=3THENWD=68
28 IFJS=7THENWD=67
30 HD=W+ WD=64 *40-(WD=65)*40+(WD=67)-(WD=68)
32 IFPEEK(SP+HD)=32THEN40
34 IFPEEK(SP+HD)=69OR(NOTPEEK(SP+HD)=F)THENCALL DIE
36 IFPEEK(SP+HD)=FTHENEXEC SCORE
40 POKESP+W,32 W=HD POKESP+W,WD POKECC+W,9 FORI=1TO0 NEXT
42 IFF(0)=4ANDF(1)=4ANDF(2)=4ANDF(3)=4ANDF(4)=4THENCALL NEXT
44 B=B-1 PRINT AT(34,0)"[illegible]" IFB=0THENCALL DIE
46 NEXTZ GOTO15
49
50 PROC SCORE
51 VOL 15 WAVE 1,00100000 ENVELOPE 1,0,0,15,0
52 MUSIC 1 "[illegible]" PLAY 2
54 F(F-70)=F(F-70)+1 SC=SC+LV*10 PRINT AT(22,0) SC IFBL=1THEN58
56 IFSC>=1000THENBFLASH 5,13,2 MUSIC 1 "[illegible]" PLAY 1 56 IFSC>=1000THENBFLASH 0 LI=LI+1 PRINT AT(14,0) "
COLOUR 13,1
58 END PROC
59
90
90 PROC BLIP
91 VOL 15 WAVE 1,00100000 ENVELOPE 1,0,9,0,2
92 MUSIC 9 "[illegible]" PLAY 2
93 END PROC
100 EXEC GRAPHICS
110 SP=50224 CC=55296 W=40 FC(0)=2 FC(1)=5 FC(2)=8 FC(3)=6 FC(4)
=2 TIMW(100)
120 SC=0 WD=66 W=122 LI=3 LV=1 B=1000 BL=0 COLOUR 13,1
125 EXEC TITLE
130 GOTO LV*10+130
140 M=10 DE=40 FT=50 GOTO240
150 M=20 DE=70 FT=40 GOTO240
160 M=25 DE=80 FT=40 GOTO240
170 M=25 DE=50 FT=35 GOTO240
180 M=35 DE=40 FT=40 GOTO240
190 M=35 DE=30 FT=30 GOTO240
200 M=40 DE=25 FT=25 GOTO240
210 M=45 DE=20 FT=25 GOTO240
220 M=50 DE=10 FT=20 GOTO240
230 M=60 DE=0 FT=20
240 EXEC SCREEN
250 EXEC FRUIT
260 EXEC MUSHROOM
```



```
280 CALL MOVE
290
300 PROC NEXT
310 VOL 15 WAVE 1 20100000 ENVELOPE 1 0 0 15 0
320 MUSIC 3 "[illegible]" PLAY1
330 SC=SC+2 PRINT AT 22 0" "SC
340 LV=LV+1 IFLV>10THENLV=10
350 FORI=0TO4 F(I)=0 NEXTI W=122 GD=60 D=550+LV*50
360 GOTO130
399
400 PROC DIE
410 VOL 15 WAVE 1 00010000 ENVELOPE 1 0,0,15 0
415 WAVE 3 00010000 ENVELOPE 3 0 0 15 0 POKE54287 0 POKE54286 0
420 MUSIC 2 "[illegible]"
" PLAY 2
430 FORI=1TO15 POKECC+W 9 FORJ=1TO10 NEXTJ POKECC+W,7 FORJ=1TO10 NEXTJ I
440 POKE54287 0 POKE54286 0
450 FORI=0TO4 F(I)=0 NEXTI LI=LI-1 IFLI=0THENCALL DEAD
460 W=122 GD=60 D=550+LV*50
470 GOTO130
499
500 PROC DEAD
510 FLASH 1 11 13 VOL 15 WAVE 1 00100000 ENVELOPE 1,0 0,15,0
520 MUSIC 2 "[illegible]" PLAY 1
530 ENVELOPE 1,0 7 0 0 MUSIC 9 "[illegible]" FLASH 0 COLOUR 6 13 PRINT
"" PLAY 1
540 CENTRE"GAME OVER" PRINT PRINT PAUSE 1
550 PRINT"[illegible]YOUR SCORE WAS"SC PRINT IFSC>HSTHEN580
560 PRINT [illegible]THE HIGHEST SCORE IS"HS
570 PRINT [illegible]" WAS ATTAINED BY "H$ GOTO600
580 PRINT"[illegible] HAVE ATTAINED THE HIGHEST SCORE"
582 PRINT"PLEASE ENTER YOU NAME (UP TO 10 LETTERS)"
584 PRINT"[illegible]"
586 FETCH [illegible] 10 H$ HS=SC PRINT
600 PLAY 1
610 PRINT"[illegible] YOU WANT ANOTHER GAME (Y OR N)"
620 GET$ IFG$=""THEN620
630 IFG$="Y"THEN130
640 IFG$<>"N"THEN620
650 COLD
999
1000 PROC MUSHROOM
1010 FORI=1TOM
1020 X=INT(RND(1)*38+1) Y=INT(RND(1)*22+2)
1030 IFPEEK(SP+X+Y*40)<>32THEN1020
1040 POKESP+X+Y*40 [illegible] POKECC+X+Y*40 5 NEXTI
1050 END PROC
1499
1500 PROC FRUIT
1510 FORI=FRIT[illegible] FORJ=1TO4
1520 X=INT(RND(1)*38+1) Y=INT(RND(1)*22+2)
1530 IFPEEK(SP+X+Y*40)<>32THEN1520
1540 POKESP+X+Y*40 I POKECC+X+Y*40,FC(I-20) NEXTJ I
1550 END PROC
1999
2000 PROC SCREEN
2010 COLOUR 1,1 PRINT"[illegible]"
2020 FORI=0TO39 POKESP+40+I 60 POKECC+80+I 5
2030 POKESP+960+I 60 POKECC+960+I 5 NEXTI
2040 FORI=2TO23 POKESP+I*40 60 POKECC+I*40 5
2050 POKESP+I*40+39 60 POKECC+I*40+39 5 NEXTI
2060 PRINT AT(19 11)"[illegible]"AT(19 12)"[illegible]"AT(19 13)"[illegible]"
2070 POKESP+W 65 POKECC+W 9
2075 PRINT [illegible]
2080 PRINT AT(0 0) "LEVEL"LVAT(9 0)"LIVES"LIAT(17 0)"SCORE"SCAT(29 0)
"BONUS"B
2090 END PROC
2999
3000 PROC TITLE
3010 PRINT"[illegible]"
3012 PRINT [illegible]
3014 PRINT [illegible]
3016 PRINT [illegible]
3018 PRINT [illegible]
3020 CENTRE"BY LEE TANNER 26/2/84" PRINT"[illegible]"
3040 CENTRE"INSTRUCTIONS ? (Y OR N)" PRINT POKE[illegible] 0
3050 GETG$ IFG$="" THEN3040
3060 IFG$="Y"THENCALL INSTRUCTIONS
3065 IFG$ [illegible]
3070 PRINT"[illegible]LEVEL"LV"[illegible]"
3080 CENTRE [illegible]E STARTING LEVEL" PRINT PRINT
3090 CENTRE"[illegible] ART GAME" PRINT
4000 GETG$ IFG$=[illegible]THEND=550+LV*50 END PROC
4010 IFG$<>"[illegible]"THEN4000
4020 LV=LV+1 IFLV=11THENLV=1
4030 PRINT AT(20 16)LV"[illegible] " GOTO4000
4999
5000 PROC INSTRUCTIONS
5010 COLOUR [illegible] PRINT "[illegible]THIS GAME CONSISTS OF A GARDEN FULL OF"
5020 PRINT"[illegible]FRUIT AND MUSHROOMS   YOU MUST CONTROL"
5030 PRINT [illegible] SPIDER TO EAT ALL THE FRUIT- BEWARE "
5040 PRINT"[illegible]U CAN  ONLY EAT  THE FRUIT INDICATED"
5050 PRINT"[illegible]BY  THE PIECE  DISPLAYED IN THE MIDDLE"
5060 PRINT [illegible]OF THE SCREEN SURROUNDED  BY MUSHROOMS"
5070 PRINT [illegible]  ALL THE  OTHER FRUIT IS POISONOUS!"
5080 PRINT [illegible]THE FRUIT WHICH YOU CAN EAT CHANGES AT"
5090 PRINT [illegible]INTERVALS DURING THE GAME "
5095 PRINT"[illegible]THE MUSHROOMS ARE ALWAYS POISONOUS[illegible]"
5100 CENTRE"PRESS ANY KEY TO CONTINUE" PRINT
5110 POKE[illegible] 0 WAIT[illegible] 1
5120 PRINT "[illegible]THERE ARE 10 LEVELS OF PLAY- LEVEL  10"
5130 PRINT [illegible]IS THE HARDEST  THE LEVEL OF PLAY GOES"
5140 PRINT"[illegible]UP WITH EACH SUCCESSIVE SCREEN "
5150 PRINT [illegible]THE LEVEL DETERMINES THREE THINGS -"
5160 PRINT [illegible]  THE SPEED OF YOUR SPIDER "
5170 PRINT [illegible]  THE NUMBER OF MUSHROOMS "
5180 PRINT"[illegible]  THE INTERVAL BETEEN FRUIT CHANGES "
5190 PRINT [illegible]THE STARTING LEVEL  CAN BE SET  BEFORE"
5200 PRINT [illegible]THE GAME STARTS "
5210 PRINT"[illegible]YOU HAVE THREE LIVES WITH AN EXTRA ONE"
5220 PRINT [illegible]WHEN YOU SCORE 1000 POINTS [illegible]"
5230 CENTRE"PRESS ANY KEY TO CONTINUE"
5240 POKE[illegible] 0 WAIT[illegible] 1
5250 PRINT "[illegible]YOUR SCORE FOR EACH PIECE OF FRUIT IS"
5260 PRINT"[illegible]EQUAL TO THE LEVEL NUMBER * 10 "
5270 PRINT"[illegible]      ON LEVEL 5 YOU SCORE 50 POINTS"
5280 PRINT [illegible]FOR EACH PIECE OF FRUIT YOU EAT "
5290 PRINT [illegible]ALL THE  TIME YOU ARE PLAYING  A BONUS"
5300 PRINT"[illegible]SCORE IS RUNNING  DOWN   IF IT REACHES"
5310 PRINT [illegible]ZERO YOU LOSE A LIFE "
5320 PRINT [illegible]IF YOU  COMPLETE THE SCREEN BEFORE THE"
5330 PRINT [illegible]BONUS  RUNS OUT  IT IS  ADDED  TO YOUR"
5340 PRINT [illegible]SCORE [illegible]"
5350 CENTRE"PRESS ANY KEY" PRINT
5360 POKE[illegible] 0 WAIT[illegible] 1
5370 COLOUR 13 1 PRINT"[illegible]"  GOTO3070
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10000 PROC GRAPHICS
10010 MEM
10020 DESIGN 2 $E000+6400
10030 [illegible]
10031 [illegible]
10032 [illegible]
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10040 DESIGN 2 $E000+6500
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10216 [illegible]
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10220 DESIGN 2 $E000+7400
10230 [illegible]
10231 [illegible]
10232 [illegible]
10233 [illegible]
10234 [illegible]
10235 [illegible]
10236 [illegible]
10237 [illegible]
11000 END PROC
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In the crystal ball

Ray Berry *looks at microprocessors and their history*

If ever you take a sneaky look inside a computer (and it may not be advisable if your computer is under guarantee), you will see one 'chip' that is usually much bigger than the rest — the microprocessor

There are only about three or four different kinds of microprocessor in all of those different computers in your high street store They can usually be recognised by the number written on the top The most common is the Zilog Z80 which can be found inside Sinclair computers like the Spectrum and the ZX81 The Z80 can also be found in the Sharp machines, the Tandy machines and the good old Video Genie, to name but a few

The other most common microprocessor is called the 6502 and this is in the BBC, the Electron the Vic, the Oric/Atmos and the good old Pet. The Commodore 64 has a microprocessor called the 6510 which which is very similar to the 6502 The odd man out is the Dragon, which has favoured the Motorola 6809 along with the Tandy Colour Computer

Whatever micro you own, you can be sure that it has a microprocessor of some description Without that microprocessor, we would not have a computer in our homes In fact we would not have microcomputers as we know them at all.

So, where did these wonderful things come from? Well back in the 1940s, the earliest of the electronic computers had processing units which consisted of thousands of glass valves much like those in the old steam radios These computers weren't very reliable in fact they broke down in a few hours The heat from all the valves was enormous and extremely difficult to cope with The first computer of this type was ENIAC which stands for Electronic Numerical Integrator And Computer This monster was developed in America in 1946 and it consisted of 18 000 valves, was 80 feet by 25 feet and weighed something in the region of 30 tons

Near the end of the 1940s the transistor was invented This led to what is now known as the second generation of computers — ENIAC being the first generation

The second generation grew up in the 1950s and the early 1960s and consisted of hundreds of circuit boards which contained thousands of transistors resistors capacitors etc In a circuit board about six inches square there was probably about 10 or 20 transistors and a hundred other components There would have been several hundred to several thousand of these boards all connected by wire — they usually filled several rooms

Later in the 1960s, the new technology really started going places The people who made the transistors developed a whole new technology It became possible to put several dozen transistors on a 'chip' of silicon and the integrated circuit was born The computer generations seem to get a bit intermerged here, but these early integrated circuits were used in what is called third generation computers

It took a lot of these chips to construct a board which could be called a computer and it required a lot of other components such as resistors and capacitors to make up the required processing power No single chip could be called a microprocessor at least not as we know them

In fact it wasn't until 1971 when a company called Intel produced the first microprocessor This microprocessor was based on a chip of silicon about a quarter of an inch square which carried 2250 transistors and all the necessary components and circuitry to be called a processing unit or microcomputer in its own right The fourth generation was born

These superchips are known as Large Scale Integration (LSI) microprocessors By 1976 these chips could carry more than 20,000 components and they formed the basis of the fourth generation computers that we buy in the shops today

The obvious question is 'What comes next?' What will the fifth generation consist of? To answer this, it is worth having a look at what we are trying to develop in 1984 and hope that that points the way Much work is going on both in this country and abroad, to develop better microprocessors

This research takes various directions one of which is to add other functions of the computer such as memory and communications facilities to the microprocessor all in a single chip One example of this is the British Transputer developed by Inmos The transputer is expected to cope with about ten million instructions per second and to be able to communicate with other transputers within the same machine making an extremely powerful computer

Another technical area of research is into the mass production of Gallium Arsenide (GaAs This is a semiconductor material like silicon but through which electrons can travel up to six times faster GaAs is already used in some advanced transistors but is difficult to produce in large quantity

As for the actual fifth generation computers themselves, what will they be like? There is a project in this country known as the Alvey Programme, which was set up last year by a government committee headed by British Telecom's John Alvey This programme, with the help of nearly £400 million from the government and British Industry, is looking into the future and researching new very large scale integrated circuits artificial intelligence and new and innovative ways to write complex programs.

Similar work is being done in the United States, but nowhere is there a more expensive and well publicised fifth generation project than in Japan It is a 10 year programme to develop computers that have knowledge and can mimic human thought processes The Japanese project is expected to have cost a thousand million pounds by the year 1990

It is difficult to look into the future Probably impossible I can remember reading an important scientific report on future technology that was published in the 1930s and they failed to predict jet aircraft, nuclear power and computers. I think I'll just put my crystal ball away



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All versions of "The Hobbit" are identical with regard to the adventure program. Due to memory limitations, BBC cassette version does not include graphics.

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Snow Go

Hungary Horace is a blue blob with arms and legs who first appeared in some games for the Sinclair Spectrum *Horace Goes Skiing* was one of these, and it has now been converted to run on the Commodore 64 Before Horace actually makes it to the ski slope, he must hire some skis from the hut on the far side of a busy road – a hazardous business since the drivers at this ski resort will mow down any pedestrian who gets in their way Once Horace has hired his skis, he has to cross over again to get the ski slope In this second phase of the game Horace has to ski down a slalom course between pairs of flags, avoiding the trees which are dotted about the slopes

The game can be played with either keyboard or joystick, and full instructions are given on the cassette insert The program loads very quickly (for a Commodore anyway) since it incorporates a high-speed loader program called *Pavloda* This loads, the game in about 2 minutes, as fast as the 1541 disk drive, it is claimed

The graphics are quite smoothly done, but are not exceptional – no better than the Spectrum original in fact. The sound is another matter though During the game itself, it is OK but no better than average However, the catchy intro music is exceptionally good – probably the best music I have heard in a game for the 64

Overall this is a well executed and entertaining program However, there is not much variety and it and I found it quite quickly becoming repetitive

Richard Corfield

Program *Horace Goes Skiing* **Price** £5 95 **Micro** Commodore 64 **Supplier** Melbourne House, Church Yard, Tring, Herts, HP235LU

Mere Human

Psytron for the spectrum comes in an exceptionally large box, with an exceptionally large booklet of instructions to match You are the Psytron 'less than human far more than mere computer', your mission being to survive a six level attack on the Betula 5 Installation The levels get more difficult and more complicated as you proceed through the game, and the last level the 'final conflict' is so difficult that the publishers are giving a prize of a QL computer to the first person to complete it (though God knows where they think they will get it from!)

The graphics are superb – each location in the game has its own high resolution picture in full perspective However my main complaint with the game is that the controls are very complicated each level has its own controls, and it is almost impossible to remember all of them Whatever happened to left, right and fire?

This is a game for the sort of person who is prepared to sit up all night trying to master each level and if you are persistent and can keep a cool head I am sure that you will find it rewarding

Simon Lane

Program *Psytron* **Price** £9 95 **Micro** Spectrum **Supplier** Beyond Software, Durrant House, 8 Herbal Hill London EC1 5JJ

Drifting into Space

Ian Bell's *Freefall* is an arcade-style game for thinking people The scenario has you as the sole survivor of an attack on a space station In a space suit, but unarmed, you have to face various nasty beasties You can punch ram and kick most of them into submission If you are dexterous enough you can even catch one of their bombs and sling it back at them You cannot win (at least I'm not good enough to beat off the attackers for more than a few minutes) but the longer you fight the better Your air supply will run out anyway but faster if you are injured In that wonderful fantasy logic of computer games you get extra lives the more points you accumulate

The game makes a most intelligent use of joysticks There are eight sectors visualised round the stick With the fire button held down moving the stick to any sector fires jets on the space suit and moves your character to match With the fire button released however the stick controls limb movements and allows you to punch and kick in any combination The animation is cleverly realistic and once you get used to the control system it is very effective There are keyboard options but frankly they are a poor alternative

Unfortunately, the display is dull black and white with such small characters that you feel only a projection tv four feet wide would allow you to feel involved in the action This game will not attract the bright lights, noises and sparkle brigade For the experienced gamester it does offer a new type of challenge intellectual as well as reactive And as you survive longer so the space-station spins faster and you have to re-learn trajectories I fear this one may be too cerebral to attract the large sales it warrants

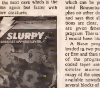
Program *Free Fall* **Price** £9 95 **Micro** BBCB **Supplier** Acornsoft 4a, Market Hill, Cambridge

Dave Watterson

In Jest

"The biggest appetite ever' is how *Slurpy* is described However don't be fooled into expecting a *Pac-Man* look-alike game, because this one is quite different. Slurpy is a green blob with an eye and a long snout, who floats about inside a cave along with various other creatures with such colourful names as Glowbug Widowmaker, Cave Phantom Creeper's Deathball and Evil Eye Anything coming close to Slurpy's snout is sucked in, accompanied by a very convincing sounding slurping noise Unfortunately, some of these creatures are poisonous and must be spat out immediately or else you will lose one of your three lives Some of them may actually attack Slurpy – this also loses you a life

Quite apart from the creatures there are also occasional earthquakes which may cause stalactites from the roof of the cave to fall on you, and in some caves a kind of deadly red whirlwind is also found If you survive all the problems in one cave and you slurp up all the creatures which are not poisonous then you move on to the next cave which is the same again but faster with more creatures



The game can be played with either keyboard or joystick, and instructions are provided on the cassette insert and in the program One or two players can take part and there are four levels of difficulty

The graphics and sound are both fairly simple, but nevertheless they are effective The graphics in particular are nicely done – there is often a lot going on in the cave. The game itself is good fun – the concept seems quite original and it is well executed

Richard Corfield

Program *Slurpy* **Price** £7 95 **Micro** Commodore 64 **Supplier** Thorn EMI Computer Software, 296 Farnborough Road, Farnborough, Hants

Microdrive

Trans-Express will, says Romantic Robot, Transfer your cassette-based software to Microdrive Note they do not claim all your software – they admit that not all will go across, and then only some 60% can be expected to run

After loading *Trans-Express* a short menu appears, offering the option of Microdrive to Microdrive, Tape to Microdrive and Instructions (the instructions, when encountered, go on about a facility called *Supertrans*, which apparently will deal with extra-large programs, but I couldn't find this facility) The user will want to see the instructions first – these consist of several onscreen pages of explanation which can be printed as desired Romantic Robot supplies no other documentation, and says that all the instructions are clear, and prompts are given from within the program This is true, but still, I would have liked a manual

A Basic program will be loaded in two parts, the header first and then the main bulk of the program Machine coded tapes are loaded in a similar manner although many of the commercial tapes available nowadays consist of several blocks of code each of which is handled separately by *Trans-Express*

Cataloguing the cartridge when all is done shows your program all present and correct Now comes the good bit – running the thing! Romantic Robot's claim that *Trans-Express* will transfer your cassette-based software to cartridge is quite correct However, not many of them will run without some modification *Manic Miner* will, but *Jet Set Willy* won't Neither will *The Hobbit*, nor any of the other long adventures for which the Microdrive would seem so suited What of more serious software? Microsphere's *Omnicalc*, about the best spreadsheet for the Spectrum wouldn't run (although there is, I believe, a version now available on cartridge) and *VU-File* will anyway only *Save* to cassette, so the exercise seemed a bit pointless to even attempt

So, *Trans-Express* fulfils the claims made for it, but only the user experienced in machine-code disassembling and reassembling would make full use of it (and they would surely have written their own routine!)

Program *Trans Express* **Price** £9 95 **Micro** Spectrum 16/48K **Supplier** Romantic Robot, 113, Melrose Avenue, London NW2

Shot Away

Carousel written by David Shepherd, is a superbly animated version of the fairground shooting gallery Your task is to shoot down rows of ducks rabbits, owls and letters which parade in three ranks above you Though the characters appear to trot their movement is very like the endless loop transporting mechanical models in a carnival booth There is also a spoked wheel spinning above the ranks which you have to shoot. Clear all the targets and a polar bear appears on screen for you to pot shot if you can – he reverses direction and speeds up with every hit – I never got more than two on him. There is also the obligatory fairground organ playing

So far, so good – an excellent, colourful game

The snag is that it is soon very boring This is very much a game for juniors who will quickly learn to time their shots and run up pleasingly high scores

Dave Watterson

Program *Carousel* **Price** £9 95 **Micro** BBC B **Supplier** Acornsoft 4a Market Hill, Cambridge

Pole Apart

If you enjoy the arcade game *Pole Position*, then you will probably enjoy *3D Speed Duel* – a similar type of game for the Commodore 64 In this you race your car versus another controlled by the 64 around a twisting circuit

Either keyboard or joystick can be used and full instructions are provided on screen The difficulty of the game can be varied considerably – you can chose the difficulty of the circuit (5 levels of twistiness), the speed of the other car (5 speeds), and the number of laps to complete (from 1 to 5)

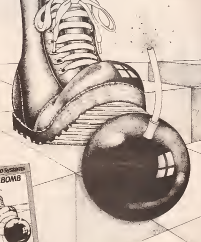
The graphics are fairly simple but effective Perspective is used to create an impression of driving around a circuit which disappears into the distance and the sky and horizon scroll horizontally as you steer your car, giving an apparently changing viewpoint

The use of sound is a bit disappointing, although you can tell how fast you are travelling from the pitch of your engine noise, which is useful However, the other car seems to be powered by some kind of silent propulsion system Also when you crash the simple graphics and sound combine to make the effect a little unspectacular

By tuning the playing options just about everyone should be able to select a game which is difficult enough to be challenging but not so difficult that it becomes frustrating However, it may eventually pall because the variety provided by the hazards normally found in other racing games (eg, oil slicks) does not occur in this one Nevertheless it provides plenty of good straightforward fun

Richard Corfield

Program *3D Speed Duel* **Supplier** DK'Tronics, Unit 6 Shirehall Industrial Estate Saffron Walden, Essex, CB11 3AQ


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Bits and pieces

***David Lawrence** takes a look at what you need to start networking*

In the first article in this series we took a brief look at some of the things that people were actually doing with micros in the field of networking

Basically, to communicate with other micros over a telephone line you need five things

1) A micro which can output to a port.
2) A modem to translate the output of the micro into a form capable of being sent down a telephone line
3) A program to deal with incoming and outgoing information
4) Some money
5) A telephone, preferably using the new format plug sockets.

Exactly which equipment you will need will depend upon which micro you start with and who you want to communicate with. The variety of modems and software being used is bewildering. The easiest area to get into is communicating with Prestel. Micronet is a service directly aimed at micro users on Prestel and they can supply equipment which will allow owners of most of the popular machines to get started. To communicate with bulletin boards and other micro users you will have to put together your own package

1) **The Micro**

Just about every popular micro on the market is now being used for communication in one way or another though it would take pages to go through the bewildering variety of commercial and amateur packages on offer for each.

If you are buying a new machine then it is only fair to point out that by far the most popular for this kind of application seems to the BBC Micro, for which there is a mass of software and hardware available at reasonable prices. The only sensible advice for other machines is to approach the people who sell or make modems and ask them whether they know of any way their equipment can be adapted to your machine

2) **Modems**

The best micros for networking are those which can output material according to a standard known as RS232. This basically lays down the way in which the on/off pattern of bits which represent the material to be transmitted can be translated into changes in voltage levels along a wire. Not all micros can actually output RS232 unaided, though most can usually have an add-on tacked onto a port to translate their output.

Once RS232 can be obtained from two micros, it should normally be possible to make them communicate, provided that you have the software to do it. What they will not do, however, is to communicate down the phone line. Feeding varying voltage levels into the telephone system is not only illegal it is pretty pointless since the whole of the system is designed to stop them.

In order to communicate via a telephone it is necessary to translate the output of the micro into audio tones which the telephone network will accept and trasmit. This task is called "modulation" — translating back into RS232 is called, unsurprisingly, "demodulation". The piece of equipment which generate sound which is fed into the telephone handset, and those which generate an acceptable telephone signal which can be fed directly down the line. The first type "acoustic" modems can normally be used with any sort of telephone. All that is required is to connect the modem to the micro and to rest the telephone in a special cradle containing a small loudspeaker and microphone which will "talk" down the phone in much the same way as you would

Modems which connect directly into the phone line are normally more reliable in use but they can usually only be used with phones fitted with the new system of easily removable spare plastic phone jacks which allow phones to be plugged and unplugged with ease. They are supplied with a two way plug so that both the phone and the modem are plugged into the same socket. Such modems require British Telecom approval (often slow in coming) before it is legal to use them, though there is nothing illegal in selling modems which have not been granted this approval

This is a very difficult area. I have a modem which is approved by BT, called the "Buzzbox" by Dacom. At the same time a very high proportion of communication goes on using unapproved modems.

The most popular modem with bulletin board users at the present is called the Minor Miracles WS2000 which costs around £120 and will deal with just about all of the different formats for communicating that you are likely to need including bulletin boards, Prestel type systems and the American Bell system. This particular modem is the only one I have seen seriously discussed over the past couple of months. But, it has to be pointed out that the WS2000 has not yet been approved by British Telecom and if you use such a modem you are liable to be fined if BT descend on your house and demand to examine your equipment.

3) **Software**

Unless you know what you are doing, there is no point in spending large sums of money on equipment without an absolute assurance that there is software available to turn your micro into a terminal for communication. In some cases, this software will come built into the micro, but none of the most popular machines have it.

A micro and modem without the software to make them work together are quite useless. There is plenty of amateur and commercial software around, but it is wise to make sure that you can get hold of some first.

4) **Money**

Just a reminder whose importance you will not realize until you receive your first phone bill after taking up networking. Unless you are careful in the use of your new equipment, it will eat up money at an alarming rate. Do keep a track of how much time you are using, it could save you from a very nasty shock

Any networker who would like to contribute ideas, routines, etc. to this page, please write to *PCW* at 12-13 Little Newport Street, London WC2R 3LD

<u>Useful Addresses</u>

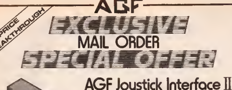
Minor Miracles, PO Box AB, Ipswich 1, IP4 2AB, Tel. 0473 50304 (Modems)

Tandata Marketing, Albert Road North, Malvern, Worcs., WR14 2TL (Modems)

Dacom, 16 Alston Drive, Bradwell Abbey, Milton Keynes, MK13 9HA, Tel. 0908 311885

Micronet 800, Scriptor Court, 155 Farringdon Rd, London, EC1M 3AD, Tel. 01 278 3143 (Complete Prestel service)


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One step, two step

M Shaffield presents a simple machine code program for pixel by pixel movement

Here is a small machine code routine that will move all the characters on the screen either 1 pixel to the right or 1 pixel to the left. Initially the basic program in Fig 1 should be entered and run.

Let x = Usr 65280 will move the whole screen 1 resolution to the right. *Let x = Usr 65310* will move the whole screen 1 resolution to the left. This program can be newed and the Usr functions will still operate. To save the m/code routine on tape for later use, enter:

SAVE "move" CODE 65280 60 To load from tape on power-up of computer enter CLEAR 65279 LOAD "move" CODE

The *Usr* functions will now operate and can be called from either the command mode or from within a program. For full effect the *USR* functions should be contained within a *For Next* loop. To prevent unwanted characters appearing on the opposite side of the screen, the right hand edge should be zapped out prior to moving to the right and the left hand edge prior to moving to the left.

An example is given in Fig 2.

It may be of interest to you to know that the machine code program was assembled using an editor/assembler on a model 1 TRS-80 computer. A copy of the assembled listing is shown in Fig 3.

Fig 1

[illegible]

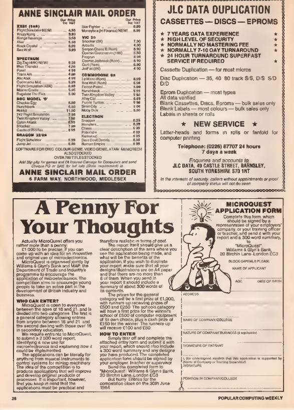
Fig 2

```
[illegible]
10 [illegible]
15 [illegible]
20 [illegible] 120 [illegible]
30 FOR [illegible] TO 40
40 PL[illegible] 0;175:DRAW INVERSE 1[illegible]
50 LET [illegible] USR 65311:REM Move [illegible]
60 NEXT n
70 FOR n = 1 TO 80
80 PLOT 255,0:DRAW INVERSE 1;0,175:[illegible] out' [illegible] edge
90 LET x = USR 65280:REM Move right
```

```
[illegible]             [illegible]              ORG   [illegible]
[illegible] [illegible]1A0  [illegible]0  START  LD    [illegible]A0H
[illegible] 7E          [illegible]0             LD    [illegible]L)
FF[illegible] CB3F      [illegible]130           SRL   [illegible]
[illegible]7            [illegible]140           LD    (HL),A
[illegible]B            [illegible]0150          DEC   HL
FF[illegible] 010817    00160                    LD    BC,6104
[illegible]B 7E         00170        LOOP        LD    A,(HL)
[illegible]C CB3F       00180                    SRL   A
[illegible]0E 3802      00190                    JR    C,SETC
[illegible]0 1804       00200                    JR    CONT
[illegible]2 23         00210        SETC        INC   HL
[illegible]3 CBFE       00220                    SET   7,(HL)
[illegible]15 2B        00230                    DEC   HL
[illegible]16 77        00240        CONT        LD    (HL),A
[illegible]7 2B         00250                    DEC   HL
[illegible]18 0B        00260                    DEC   BC
FF19 78                 00270                    LD    A,B
[illegible]1A B1        00280                    OR    C
FF1B 20EE               00290                    JR    NZ,LOOP
FF1D C9                 00300                    RET
FF1E 210040             00310        MOVEL       LD    HL,16384
FF21 7E                 00320                    LD    A,(HL)
FF22 CB27               00330                    SLA   A
FF24 77                 00340                    LD    (HL),A
FF25 23                 00350                    INC   HL
FF26 010817             00360                    LD    BC,6104
FF29 7E                 00370        LOOP2       LD    A,(HL)
FF2A CB27               00380                    SLA   A
FF2C 3802               00390                    JR    C,SETC2
FF2E 1804               00400                    JR    CONT2
FF30 2B                 00410        SETC2       DEC   HL
FF31 CBC6               00420                    SET   0,(HL)
FF33 23                 00430                    INC   HL
FF34 77                 00440        CONT2       LD    (HL),A
FF35 23                 00450                    INC   HL
FF36 0B                 00460                    DEC   BC
FF37 78                 00470                    LD    A,B
FF38 B1                 00480                    OR    C
FF39 20EE               00490                    JR    NZ,LOOP2
FF3B C9                 00500                    RET
FF00                    00510                    END   START
00000 TOTAL ERRORS

CONT    FF16  00240  00200
CONT2   FF34  00440  00400
LOOP    FF0B  00170  00290
LOOP2   FF29  00370  00490
MOVEL   FF1E  00310
SETC    FF12  00210  00190
SETC2   FF30  00410  00390
START   FF00  00110  00510
```

Fig 3



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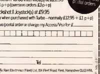
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Key to the QL

***John Cochrane** kicks off a new page for QL owners with first impressions and a look at the SuperBasic Rom*

My first impression of the QL was that it looked just like the photos. Not surprising perhaps but it left me a little at a loss for what to do next.

Without an up-to-date manual I felt a bit hamstrung, so one of the first things I did was to *Peek* through the Rom to find the keywords available. This proved to be very useful and I have listed most of them below. This list will continue next week.

SuperBasic is by no means complete yet and may well change as time goes by — this is presumably why no manuals were sent out with the machines. However it seems unlikely that major revisions will be made at this late stage so the list given below should not prove too unreliable. The program which I used to obtain the commands is as follows:

```
100 BAUD 9600

110 OPEN #5;"SER1"

120 FOR N=15050 TO 15352,17161 TO 17216,19980
    TO 20050,

26980 TO 27950,32210 TO 32240,34276 TO 34450

130  M=PEEK(N)

140  SELECT M=32 TO 128:PRINT #5;CHR$(M);

150 END FOR N

160 STOP
```

Notice that I am showing off by using the very useful extended versions of *For*, the short version of *Select* and the SuperBasic terminator *End For N*. The program would work perfectly happily with conventional Basic statements but I enjoy exercising new found programming skills. The number ranges in Line 120 refer to blocks of Rom which I had previously noted as containing things of interest, such as error messages and commands, by listing through the whole Rom to screen. Lines 100 and 110 set up RS 232 Port 1 for output to the printer at a baud rate of 9600. Watch out for Channel 5 however. I used it almost continuously for output to the printer but I think that it is usually used for the sound channel. You can use another number. Line 140 restricts print-out to those characters which may be of interest, ignoring unprintable characters.

The end result of this is a somewhat jumbled listing of words and miscellaneous characters. The list below gives my interpretation of that listing. I have left out those "words" which appear most unlikely and have marked those which I am most unsure of. I have guessed the function of many of the keywords so watch out for changes.

ABS (a) — Returns absolute value of a.
ARC (x y a b c) — Draws a part of a circle. I couldn't deduce what the last three parameters did.
ARC_R — A version of Arc using relative co-ordinates?
AUTO n m — Allows automatic generation of line numbers from Line n in steps of m.
BAUD n — Sets baud rate n for use with serial ports.
BECOMES n — Sets baud rate n for use with serial ports.
BECOMES — Looks interesting but I couldn't get it to do anything.
BEEP a,b c,d,e f g h — Sound. Can leave off most of the parameters for simple sounds.
BEEPING — Don't know. Tests to see if sound still being generated?
BLOCK n x y w h — Fill block in window n defined by width and height at x,y.
BOOT MDV1_BOOT — Load and run program *BOOT* from Microdrive 1.
BORDER n w s — Sets up a border around window n of width w, colour determined by s.
CALL n — Calls a machine code subroutine at memory location n.
CHR$ (n) — Gives the string with code n.
CIRCLE x y r — Draws a circle at centre x,y of radius n. May allow additional parameters e a for eccentricity (0 to 1) at an angle a.
CIRCLE_R — Similar to CIRCLE but using relative co-ordinates?
CLEAR n — Clears the variable space. It accesses n but I don't know what it does.
CLOSE #n — closes channel n.

CLS n — Clears window n.
CODE (a$) — Gives the Ascii value of the first character of a$.
CONTINUE — Resumes program running after break.
COPY a TO b — Copies a named set of data from one channel to another.
COPY_N — Don't know.
COS (a) — Trig.
ACOS (n) — Trig.
COT (a) — Trig.
ACOT (n) — Trig.
CSIZE w h — Sets display character height and width. I couldn't get this to work.
CURSOR n x,y — Re-positions the print location in window n.
DATE — Gives stored date and time. Rumoured to be the chip.
DATE$ — ?
ADATE — ?
SDATE d m y h m s — Reset internal clock.
DATA — Used to store variables-data within a program (See *Read*).
DAYS (n) — Returns a day of the week corresponding to n.
DEFine FuNction, DEFine PROCedure — Start of SuperBasic function or procedure.
DEG — Converts radians to degrees?
DELETE — Used for deleting files on a Microdrive cartridge.
DIM — For dimensioning arrays.
DIR MDVn_ — Lists the files on Microdrive n.
DIV — Integer divide. (I'm suspicious that integers are not implemented fully if at all. I didn't have time to check.)
DLINE — Deletes program lines. Can delete single lines or blocks of lines.
EDIT n — Fetches line n for editing.
ELLIPSE x y r — May have more parameters, seems to work as *Circle*.
ELLIPSE_R — Relative co-ords?
ELSE — Used in long form of *If*.
END FOR, END DEFine, END SELECT — Used as a terminator.
EOF — Used to send end of file marker to a given channel?
ERRor — Probably not implemented yet, usually would expect this to be used with *On Error Goto* etc.
EXEC — To load a sequence of programs and run them in parallel.
EXEC_W — As EXEC but waits for 1st program to finish before returning to the command level.
SEXECS — Used to save *Exec* to Microdrive?
EXIT — To exit a program construct such as a *Repeat* loop.
EXP (n) — Exponential.
FILL — Presumably fills a shape with colour. I couldn't get any response.
FILL$ — ?
FLASH — Causes colour flashing in low-resolution mode.
FOR n = — Sets up start of loop with variable n taking values defined by the remainder of the line. These can be single values separated by commas and/or a range of values to be stepped through.
FORMAT — For setting up blank Microdrive cartridges for the storage of programs and data.
GOTO n — Transfer to Line n of a program (frowned on by SuperBasic).
GOSUB n — Start subroutine at Line n.
HRESPR — If this is a command I don't know what it may do. I was hoping that it might allow a high resolution copy of a window to be sent to a printer but I couldn't get it to do this.
INK n — Sets foreground colour.
INKEY$ — Returns the character last pressed at the keyboard (or from some other channel). Watch out for this one, the keyboard works through a buffer and INKEY$ gets data from the buffer. Thus if several keys are pressed between INKEY$ the value returned will be the first key pressed and so on until the buffer is empty, not the current key being pressed (See *Keyrow*).
INT (n) — Truncates n to leave an integer.
INSTREN — Not at all sure if this is a valid keyword.
INPUT — Allows input of data from a specified channel or the keyboard.
KEYROW (n) — The keyboard is set up as "rows" of eight keys, this command returns a number indicating the keys pressed in row n. Does not work through the buffer and so is useful for real-time applications.
LBYTES — Load machine-code from microdrive?
LEN (a$) — Length of a string.
LET — Start of a Basic assignment (optional).
LINE x y TO x y — Draws a line from one point to another.
LINE_R — A relative version of *Line*?
LIST — Lists program lines.

continued next week



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Filed in sequence

***Adrian Werman** demonstrates a utility program that will resequence a Basic text file*

Many of the commercial Assembler programs on the market (such as the excellent 'Mikro cartridge) work in a fashion whereby they treat the source code (ie, the machine-code mnemonics) entered by the programmer as a form of Basic program. In other words, each instruction has a line number and a corresponding program statement on that line. (Naturally, such source codes cannot be Run in the normal fashion!)

During the course of using such programs, I have often found that I wish to insert additional lines in between the source instructions already present. Even when using the excellent principle of having lines with increments of 10 between each consecutive line the addition of extra lines of source code mean that the gaps often become impossibly small, ultimately requiring a manual resequencing to give more space. (Why not put more instructions on to the same line? Because it makes already difficult code even harder to read and understand.)

The primary purpose of this routine is to provide a utility program that will resequence an entire Basic text file for you. This is equivalent to 'renumbering' a Basic program, but note that *Goto's* and *Gosub's* are not altered! The utility provided (referred to as *RESEQ* from now on) is called by jumping directly into machine code supplies the following two pieces of information:

1) The first line number to be used in the text file
2) The 'step' between each subsequent line

Thus, an example of using *RESEQ* would be

```
SYS 49152,1000,20
```

This will cause the RESEQ program to replace the old line numbers with the sequence

```
1000
1020
1040
```

. and so on

Note that in the listings provided, the 'step size' between lines is restricted to the range 1 to 255, although modification is extremely easy to achieve.

Two listings are provided: one is the Assembly listing, which is referred to in the following program description, and the other is a Basic loader program.

Note that the program is completely relocatable. At present (using the supplied Basic loader) the program will be stored from location 49152. To alter this value to (say) the cassette buffer, change line 1040 of the Basic loader to read

```
1040 ADDRESS=828
```

Be careful when doing this that the program will not be overwritten in the course of using the machine. For example, if you move the program to the cassette buffer and then use the cassette in any way, the program would be corrupted, almost certainly producing a 'crash' when next used.

Program Notes

(Please refer to the assembly listing while following the program description.)

The whole key to the program resides in the fact that the user must be able to transfer information to the rq routine. This information consists of the new number for the first line in the file and the increment between line numbers in the subsequent lines.

1130-1150 These three lines perform a simple but vital task. Upon entry to the routine (after the *SYS command*) there will be a system variable which is pointing to the *first* character after the sys address. Thus, in this case, the pointer is pointing to a comma character.
Line 1130 checks to ensure that the comma is present. This is a Rom routine with the advantage that if a comma is not found, a 'syntax error' message will be produced automatically.
Line 1140 searches for and evaluates, any expression following the comma just located using line 1130. This is a very powerful Rom routine in that any expression can be used including variables or constants. The result of the evaluation is left in an area of system variables called 'Floating Point Accumulator 1'. Any illegal character in the expression will cause a suitable system error message.
Line 1150 uses a Rom route that converts the value in the F.P. Accumulator 1 into a 2-byte integer. If the number will not fit, an error message will be produced. Upon returning from this routine, A has the high byte and Y has the low byte.

1130-1190 The integer value in A and Y represents the line number to be given to the first line in the text file. Line numbers cannot exceed 63999, so a check is made to see if the line number is too large (lines 1160-1170). If the value is too big, then a jump is made to artificially force an error message. If the line number is valid, then it is stored in two unused zero-page locations, $FB and $FC.

1230-1320 These lines search for, evaluate and store the increment between lines. Lines 1230-1240 release a location in zero page by preserving its value on the stack. Lines 1250-1270 search for the increment number which must follow a comma character. Note that these lines are identical to lines 1130-1150. Lines 1280-1290 ensure that the increment is not larger than 255. Lines 1300-1320 ensure that the increment is not zero, and then store the valid increment in zero page location $14.

1360-1390 These lines place the address in memory of the start of the first line in the Basic text area. Usually this is $0801 (which is assumed to be the case here); alternatively, the address can be found from the vector stored at $2B and $2C — 'Start of Basic'.

1460-1500 These lines check to see if there is in fact a line in which to change the line number. If there is no line, then the CBM Operating System places two 0's where the line number would be expected. Using the vector at $FD and $FE, a check is made to see if these bytes are both zero. If so, then the job is completed. Note that this check is performed before attempting to assign the new line number, to prevent a non-existent line being created.

1550-1630 The old line number is replaced by the new line number (which is the value stored in $FB and $FC).

1640-1730 The next line number is calculated by adding the increment (stored at $14) to the old line number that has just been used.

1740-1810 The Operating System also includes within each line of text, a pointer to the start address of the next line in memory. This value is retrieved from the current line and placed in $FD and $FE, thus moving the vector to the next line.

1860-1880 Go around and check to see if this is the end of the program file.

1900-1920 If (in lines 1860-1500) no next line was found, the computer jumps to these instructions. The value which was in location $14 has been placed onto the start for storage, so it is now restored and a return made back to Basic.

1980 If any illegal value is entered for the line number or for the line increment, a jump is made to this instruction, which jumps directly into the Basic Roms to give an error message and then return to Basic.

```
1000 REM BASIC LOADER                 ENTRY PROGRAM
1010 :
1020 REM BY A.WERMAN
1030 :
1040 ADDRESS=49152
1050 SUM=0
1060 :
1070 FOR LOC=ADDRESS TO ADDRESS+100
1080  READ DATUM
1090  POKE LOC,DATUM
1100  SUM=SUM+DATUM
1110 NEXT LOC
1120 :
1130 IF SUM<>[illegal] THEN PRINT "SUM ERROR "
1140 STOP
1150 :
1160 DATA  32,253,174, 32,138,173, 32,[illegible]
1170 DATA 165,201,250,176, 88 132,251,133
1180 DATA 253,165, 20, 72, 32,253,174, 32
1190 DATA 138,173, 32,247,183,201,  0,208
1200 DATA  65,192,  0,208, 64,133, 20,169
1210 DATA   1,133,[illegible],169,  8,133,254,160
1220 DATA   0,177,253,208, 17,253 240, 38
1230 DATA 200,165,251,145,253,200,165,252
1240 DATA 145,253,165,251, 24,101, 20 133
1250 DATA 251,165,252,105,  0,133,252,136
1260 DATA 136,177,253,170,136,177,253,133
1270 DATA 253,138,208, 24,144,204,104,133
1280 DATA  20, 96, 76, 72,178
```



```
033C             ; RESEQUENCER PROGRAM.
033C             ;
033C             ; ACTIVATE BY "SYS 49152,X,Y",
033C             ; WHERE X=START LINE NUMBER, AND
033C             ; Y=STEP BETWEEN LINES.
033C             ;
033C             ; IDENTIFY START OF PROGRAM.
033C             ;
C000             *=$C000
C000             ;
C000             ; CALCULATE AND PRESERVE START LINE
C000             ; NUMBER.
C000             ;
C000 20FDAE START      JSR $AEFD
C003 208AAD            JSR $AD8A
C006 20F7B7            JSR $B7F7
C009 C9FA              CMP #$FA
C00B B055              BCS BADVAL
C00D 84FB              STY $FB
C00F 85FC              STA $FC
C011             ;
C011             ; CALCULATE AND FIND STEP NUMBER.
C011             ;
C011 A514              LDA $14
C013 48                PHA
C014 20FDAE            JSR $AEFD
C017 208AAD            JSR $AD8A
C01A 20F7B7            JSR $B7F7
C01D C900              CMP #$00
C01F D041              BNE BADVAL
C021 C000              CPY #$00
C023 F03D              BEQ BADVAL
C025 8414              STY $14
C027             ;
C027             ; FIND START OF BASIC TEXT.
C027             ;
C027 A901              LDA #$01
C029 85FD              STA $FD
C02B A908              LDA #$08
C02D 85FE              STA $FE
C02F             ;
C02F             ;
C02F             ; MAIN LOOP OF LINE RESEQUENCE.
C02F             ;
C02F             ; FIRST TEST FOR END OF TEXT.
C02F             ;
C02F A000  LOOP        LDY #$00
C031 B1FD              LDA ($FD),Y
C033 C8                INY
C034 11FD              ORA ($FD),Y
C036 F026              BEQ EXIT
C038             ;
C038             ; NOT END OF TEXT, SO CHANGE THIS
C038             ; LINE NUMBER.
C038             ;
C038 C8                INY
C039 A5FB              LDA $FB
C03B 91FD              STA ($FD),Y
C03D C8                INY
C03E A5FC              LDA $FC
C040 91FD              STA ($FD),Y
C042             ;
C042             ; CALCULATE NEXT LINE.
C042             ;
C042 A5FB              LDA $FB
C044 18                CLC
C045 6514              ADC $14
C047 85FB              STA $FB
C049 A5FC              LDA $FC
C04B 6900              ADC #$00
C04D 85FC              STA $FC
C04F             ;
C04F             ; FIND START OF NEXT TEXT LINE.
C04F             ;
C04F 88                DEY
C050 88                DEY
C051 B1FD              LDA ($FD),Y
C053 AA                TAX
C054 88                DEY
C055 B1FD              LDA ($FD),Y
C057 85FD              STA $FD
C059 86FE              STX $FE
C05B             ;
C05B             ; GO AND MODIFY THE NEXT LINE.
C05B             ;
C05B 18                CLC
C05C 90D1              BCC LOOP
C05E             ;
C05E             ; FINISH PROGRAM.
C05E             ;
C05E 68    EXIT        PLA
C05F 8514              STA $14
C061 60                RTS
C062             ;
C062             ;
C062             ; AN ILLEGAL VALUE WAS ENTERED, SO
C062             ; PRODUCE ERROR MESSAGE.
C062             ;
C062 4C48B2 BADVAL     JMP $B248

LABELS:

C062 BADVAL      C05E EXIT      C02F LOOP      C000 START
```

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the _Program of the Week_ double our new fee of £6 for each program published.

Falcon Fighter

on Vic20

The aliens are attracking Earth. You are the last of the great warriors and in your Falcon, equipped with air to air missiles you must save us all from these unfriendly beings.

As you fly low over the cities you see aliens in the distance. You must choose your strategy and attack boldly.

There are 10 different waves of aliens and you complete a wave every 500 points. But to kill all the aliens you must watch your fuel consumption.

Variables

W	Which alien
L1	Lives
AL(1)	Alien No 1
AL(2)	Alien No 2
FU	Fuel
PP	Scroll city
O$ R$ C$	Graphic for city
F	Position of missile
CO	Colour
SC	Score
G	How long missile lasts
A$	Get A$ (moving falcon)
F1	When missile is launched
E(1)	Random number for Alien 1
E(2)	Random number for Alien 2

Program notes

The game is in two parts. The first listing must be saved and then _run_ before loading the second.

Program 1

20	Set usable definable graphics
30-120	Data for graphics

Program 2

1-5	Screen display
6	Set volume
8-9	Set variables
90	Set colour of screen
110-130	Set variables to be scrolled
140-142	See if missile has hit
160-153	Change aliens
159-162	See which key is pressed
160	See if fuel has run out
164-167	Check missile
166	How long missile lasts
169	Make sure you do not go off screen
170-180	Scroll the city below
182-183	Move aliens
220	Set screen for graphics
300-310	See if alien hits you
400-402	Crash routine
500-590	Game over

```
10 REM***FALCON FIGHTER***
20 FORI=7168TO7351 READJ POKEI,J NEXT
30 DATA128 192,254,255,255,56,48,32
40 DATA1,63,127,255,199,199,199,255,255,255,199,198,100,254,254,255
50 DATA128,252,254,255,227,227,227,255,255,255,227,98,98,127,127,255
60 DATA24 60,126,255,255,255,255,255,126,60,24,24,24,24,24,60
70 DATA0,0,0,0,0,0,0,255,0,0,0,0,0,0,0,0
80 DATA31 31,127,191,255,255,255,66,0,0,12,18,127,255,255,66
90 DATA66,129,153,255,255,153,129,66,0,60,126,255,213,255,126,60
95 DATA0 14,124,252,252,124,14,0
97 DATA146,84,40 0,40,84,146,0,255,213,255,171,255,213,255,171
100 DATA240,136,136,159,153,249,17,31,24,60,155,60,60,60,66,125,0,0,0,0,0,0,0,12
8
110 DATA129,153,90,102,102,90,153,129,8,28,34,62,65,65,54,8,0,0,0,0,0,100,146 40,0
120 DATA1,3,127,255,255,28,12,4
130 PRINT"LOAD FALCON FIGHTER 2"
0 POKE36869,255 GOSUB210 W=13
1 PRINT"   SCORE   |   FUEL     ",
2 PRINT"           |            ",
3 PRINT"           |            ",
4 PRINT"           |            ",
5 PRINT"0000000000000000000000",
6 POKE36878,15
8 L1=3
9 AL(1)=8030 AL(2)=8064 FU=1000 PRINT"FU"
90 POKE36879,25
100 PP=0
110 O$="0000000000000000000000"
120 R$="HHHHHHHHHACHHHHHHACHHHEHHHHHEHHHHHHHHHHHHHHHHHHACHHHHHHHHHHHEHHHH"
130 C$="GGGGGGGGGBDGIGGGGBDGJGFOGGGGFGJGGGGGGGGGGGGGGJGGGBDGGGGGGGGGFGIGG"
140 FORPP=22TO67
141 IFPEEK(F)=WTHENPOKEF,14 POKEF+CO,2 SC=SC+100 POKE36876,0 G=9 GOTO144
142 IFPEEK(F+1)=WTHENPOKEF+1,14 POKEF+1+CO,2 SC=SC+100 POKE36876,0 G=9 GOTO144
143 GOTO145
144 POKE36877,220 FORT=15TO0STEP-.1 POKE36878,T NEXT POKE36877,0 POKE36878,15
145 IFSC=500THENW=12
146 IFSC=1000THENW=11
147 IFSC=1500THENW=16
148 IFSC=2000THENW=17
149 IFSC=2500THENFU=FU+500 W=18
150 IFSC=3000THENW=19
151 IFSC=3500THENW=20
152 IFSC=4000THENW=21
153 IFSC=4500THENW=22
158 GOSUB300
159 GETA$ IFA$="A"THENPOKEQ,8 Q=Q-22 POKEQ,8 POKEQ+CO,0
160 IFA$="Z"THENPOKEQ,8 Q=Q+22 POKEQ,8 POKEQ+CO,0
161 IFQ>8141THEN400
162 IFA$=" "THENF1=1 POKEF,8 F=Q+1 FU=FU-10 PRINT"                    "FU
" G=0
163 IFFU=<0THEN500
164 IFF1=1ANDPEEK(F)=32THEN167
165 IFF1=1ANDPEEK(F)=7THEN167
166 IFF1=1ANDPEEK(F)<>8THENPOKEF,14 POKEF+CO,2 FORU=1TO200 NEXTU G=5 G=9 GOTO168
167 IFF1=1THENPOKEF,8 F=F+1 POKEF+CO,2 POKEF,7 G=G+1
```

(continued on page 37►)


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continued from page 36)

```
168 IFG=>9THENG=0 F1=0 POKEF,0 POKE36 ... 600
169 IFQ>8097ANDQ<8141THENPOKEQ,0 PO ...
170 PRINTLEFT$(C$ 20)LEFT$(RIGHT$ $$, ... $($$, ...
180 PRINTO0LEFT$(RIGHT$(C$,80-PP)+LEFT$(C$,PP),22
181 IFF1=1THENPOKE36874,160
182 FORY=1TO2 POKEAL(Y),8
183 E Y)=INT(RND(1)*9 +1
184 IFE Y =1ORE(Y)=2THENAL(Y)=AL(Y)+21
185 IFE Y >2ANDE(Y)<8THENAL(Y)=AL(Y)-1
186 IFE Y -9ORE(Y)=10THENAL(Y)=AL(Y -23
187 IFAL ,, 7 ANDAL(Y)>8142THENAL(Y)=7921
188 POKEAL Y, W POKEAL(Y)+CO 0 NEXT
189 PRINT"XXXXXX SC
190 GET
200 PP=9 GOTO140
210 REM
220 POKE*2,28 POKE56 28 Q=7900 CO=30720 POKEQ,0 POKEQ+CO,0 POKE650 255 RETURN
300 IFPEEK(Q+1 =2THENRETURN
305 IFPEEK(Q+1 =32THENRETURN
310 IFPEEK Q+1)=7THENRETURN
320 DF=1
400 POKEQ 14 POKEQ+CO 2
402 POKE36877 220 FORI=15TO0STEP .1 POKE36878 U NEXT LI=LI-1 POKE36878,15 POKE36
877 0
403 POKEQ,8
404 IFDF=1THENPOKEQ,15 POKEQ+CO,0 DF=0
405 IFLI=0THEN500
410 Q=7900 GOTO140
500 PRINT XXXXXXXXXXXXGAME OVER"
510 FORI-1T 2000 NEXT
555 PRIN  ... ANY KEY  POKE36878 0
580 POKE1... 0 WAIT198 1
590 RUN
```

Falcon Fighter
by Paul Biddle

Three Unknowns

on Spectrum

There are many programs readily available for solving two simultaneous equations in two unknowns. This program, however, solves three equations in three unknowns. It is based, as for the two equation case, on forming a matrix of the coefficients of the unknowns, inverting this matrix, and then multiplying the constant terms (in the form of another matrix) by this inverse matrix.

Unfortunately, the inversion of a 3 by 3 matrix is more complicated than is the case for a 2 by 2. This program carries out this inversion, multiplies the constant terms, and prints the value of each of the three variables.

Program notes

20	Set up arrays.
30–110	Input data.
120–200	Finding the cofactors of the matrix (part of the inversion process)
210	Finding the determinant of the matrix
230–250	Inverting the matrix and finding the variables
250–260	Printing the results

```
  10 REM  PROGRAM FOR SOLVING
THREE SIMULTANEOUS EQUATIONS IN
THREE UNKNOWNS BY G.A.YOUNG.
© 1984
  20 DIM A(3,3): DIM B(3,3): DIM
 D(3)
  30 FOR A=1 TO 3
  40 PRINT "FOR EQUATION ",A
  50 PRINT "OF THE FORM AX+BY+CZ
=D"
  60 INPUT "A(",(A),")=",A(A,1)
  70 INPUT "B(",(A),")=",A(A,2)
  80 INPUT "C(",(A),")=",A(A,3)
  90 INPUT "D(",(A),")=",D(A)
 100 CLS
 110 NEXT A
 120 LET B(1,1)=A(2,2)*A(3,3)-A(
2,3)*A(3,2)
 130 LET B(1,2)=-(A(2,1)*A(3,3)-
A(2,3)*A(3,1))
 140 LET B(1,3)=A(2,1)*A(3,2)-A(
2,2)*A(3,1)
 160 LET B(2,1)=-(A(1,2)*A(3,3)-
A(1,3)*A(3,2))
 160 LET B(2,2)=A(1,1)*A(3,3)-A(
1,3)*A(3,1)
 170 LET B(2,3)=-(A(1,1)*A(3,2)-
A(1,2)*A(3,1))
 180 LET B(3,1)=A(1,2)*A(2,3)-A(
1,3)*A(2,2)
 190 LET B(3,2)=-(A(1,1)*A(2,3)-
A(1,3)*A(2,1))
 200 LET B(3,3)=A(1,1)*A(2,2)-A(
1,2)*A(2,1)
 210 LET DETA=A(1,1)*B(1,1)+A(1,
2)*B(1,2)+A(1,3)*B(1,3)
 220 IF DETA=0 THEN PRINT AT 11,
5,"NO UNIQUE SOLUTIONS": STOP
 230 LET X=(B(1,1)*D(1)+B(2,1)*D
(2)+B(3,1)*D(3))/DETA
 240 LET Y=(B(1,2)*D(1)+B(2,2)*D
(2)+B(3,2)*D(3))/DETA
 250 LET Z=(B(1,3)*D(1)+B(2,3)*D
(2)+B(3,3)*D(3))/DETA
 260 PRINT AT 8,3,"X=",X
 270 PRINT AT 10,5,"Y=",Y
 280 PRINT AT 12,6,"Z=",Z
 290 STOP
```

Three Unknowns
by G Young



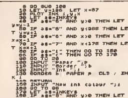
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Open Forum

Screen Design

on Spectrum

This is a utility program used to construct various screen pictures. Although short, it has enough features to produce quite pleasing results.



```
   5 GO SUB 100
  10 LET y=128: LET x=87
  20 PLOT INK i,y,x
  30 LET a$=INKEY$
  40 IF a$="5" AND y>0 THEN LET
y=y-1
  50 IF a$="8" AND y<255 THEN LE
T y=y+1
  60 IF a$="6" AND x>0 THEN LET
x=x-1
  70 IF a$="7" AND x<175 THEN LE
T x=x+1
  80 IF a$="i" THEN GO TO 150
  85 IF a$="c" THEN GO TO 170
  90 GO TO 20
 100 INPUT "Paper ";p
 110 INPUT "Border ";b
 120 INPUT "Ink ";i
 130 BORDER b: PAPER p: CLS : IN
K i
 140 RETURN
 150 INPUT "New ink colour ";i
 160 GO TO 80
 170 LET a$=INKEY$
 180 IF a$="5" AND y>0 THEN LET
y=y-1
 190 IF a$="8" AND y<255 THEN LE
T y=y+1
 200 IF a$="6" AND x>0 THEN LET
x=x-1
 210 IF a$="7" AND x<175 THEN LE
T x=x+1
 220 IF a$="c" THEN GO TO 80
 230 PLOT y,x: BEEP .01,30: PLOT
 INVERSE 1;y,x
 240 GO TO 170
```

Screen Design
by J Yeomans

Microradio

GW6JJN

Shades of grey

As promised last week here is a review of the G4IDE Microsystems Slow Scan Television program. Since amateur television is invariably sent in monochrome, the representation of pictures on the TV screen generated by the computer (or the ZX Printer, for that matter) poses a problem in that each pixel on the screen can only be either on or off and the necessary shades of grey are not possible. Roger Barker, the author of 'Scan' has got around this problem in an extremely elegant way. He has invented something called the 'Super Pixel'. This consists of four pixel groups which, depending on how many of the group are on or off, will give five shades of grey. This approach limits the resolution to 128 x 96 which is more than adequate.

When the program is receiving television pictures, the screen can be copied to the printer at any time which makes for some very fine printouts. Screens can also be saved to cassette for later transmission or viewing or even 'processing'. In this sense, processing is a routine to restore full contrast to low contrast pictures and can be used at any time during receive.

The transmission facilities of this program are simply incredible. The transmitted signal is encoded into a six tone audio system not unlike the

Two tone RTTY signal but more complex. Five tone levels are for the various shades of grey and the sixth is the synch pulse. Six complete picture screens can be held in memory at any given time all instantly available for transmission.

So how are the screens created? No problem. The program contains two routines to do just this. The first is a bold writing routine which will create up to six rows of eight characters in normal or inverse. The second is a drawing routine which can create medium resolution pictures or diagrams in five shades of grey. This program, which costs only £10, could be said to be worth the money for these routines alone. All screens can, of course, be saved to tape for further use — in fact, a library of pictures either created or saved from previous on air contacts could make your station one of the more interesting and sought after stations in the world, all without breaking the bank.

Of course the bold writing option can be called and used on air for fairly spectacular results. Extensive instructions on how to construct, receive and transmit interfaces if you don't have such things lying around come with the cassette.

Both Scan and the RTTY program reviewed last week put G4IDE Microsystems in a class of their own as a software house. Roger Barker, the programmer, is to be congratulated in taking the Spectrum where no Spectrum has gone before. G4IDE Microsystems is at 10 Fontwell Road, Wolverhampton, MV10 6PS (tel Wolverhampton 781760).

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to Ray Berry, Microradio, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP.

Rombug

on Spectrum

This is an exciting arcade style game in which you must try to prevent your Spectrum being overrun by bugs

Program notes

2	Jumps to Udg subroutine
11-20	Sets up screen
30-47	Variables
50-130	Bug movement
140-300	Players movement
1000-3020	Screen messages
9000-9030	Udg subroutine

```
1 BORDER 4: INK 0: CLS
2 GO SUB 9000
3 LET S=0: LET T=1000
5 BORDER 4
11 PRINT #1,"ROM CARTRIDGES CLEARED ";S
12 PRINT AT 0,0, INK 3;"[illegible]
14 FOR F=0 TO 21: PRINT AT F,0, INK 3;"▒",AT F,31, INK 3,"▒": NEXT F
15 FOR F=0 TO 31: PRINT AT 21,F; INK 3;"▒": NEXT F
19 LET h=INT (RND*17)+2: LET J=INT (RND*12)+15: FOR F=h TO h+2: PRINT AT F,J; FLASH 1; INK 2; PAPER 0;"▒▒": NEXT F
20 FOR F=0 TO t/30: PRINT AT INT (RND*16)+2,INT (RND*30), INK 3;"▒": NEXT F
30 LET d1=0: LET d2=1
31 LET a=11: LET b=29
40 LET x=12+INT (RND*5): LET y=1+INT (RND*5)
45 LET xx=x: LET yy=y
46 LET aa=a: LET bb=b
47 LET T=T-1
48 IF T=0 THEN GO TO 3000
52 PRINT AT x,y; ...
60 IF ATTR (x+1,y)=59 THEN LET d1=4
70 IF ATTR (x-1,y)=59 THEN LET d1=0
80 IF ATTR (x,y+1)=59 THEN LET d2=2
90 IF ATTR (x,y-1)=59 THEN LET d2=1
100 IF d1=4 AND X<21 THEN LET x=x-1
110 IF d1=0 AND X>1 THEN LET x=x+1
120 IF d2=2 AND Y>1 THEN LET y=y-1
130 IF d2=1 AND Y<31 THEN LET y=y+1
135 IF ATTR (x,Y)=170 THEN GO TO 1000
140 PRINT AT xx,yy, INK 7;" "
150 IF INKEY$="8" AND ATTR (a,b+2)<>59 AND ATTR (a+1,b+2)<>59 THEN LET b=b+1
151 IF INKEY$="5" AND ATTR (a,b-1)<>59 AND ATTR (a+1,b-1)<>59 THEN LET b=b-1
160 IF INKEY$="6" AND ATTR (a+2,b)<>59 AND ATTR (a+2,b+1)<>59 THEN LET a=a+1
161 IF INKEY$="7" AND ATTR (a-1,b)<>59 AND ATTR (a-1,b+1)<>59 THEN LET a=a-1
180 PRINT AT aa,bb, INK 7;"  ",AT aa+1,bb, INK 7;"  "
181 PRINT AT a,b; INK 3;"▒▒",AT a+1,b; INK 3;"▒▒"
300 GO TO 45
1000 PRINT AT 10,11; FLASH 1;"WELL DONE"
1010 FOR G=4 TO 1 STEP -1: FOR F=0 TO 30 STEP 3: BEEP G/100,F: BEEP G/100,F-30: NEXT F: NEXT G
1020 LET S=S+1
1030 CLS : GO TO 4
2000 STOP
3000 PRINT "TIME RAN OUT AND THE BUG RUINED YOUR ROM!!!! PRESS ANY KEY TO PLAY......"
3001 PRINT "YOU SAVED ";s;" SPECTRUMS......."
3005 FOR f=50 TO 0 STEP -1: BEEP .01,f: NEXT f
3010 IF INKEY$<>"" THEN RUN
3020 GO TO 3010
9000 FOR f=144 TO 146: FOR n=0 TO 7: READ a: POKE USR CHR$ f+n,a: NEXT n: NEXT f
9010 DATA 255,129,BIN 10111101,BIN 10100101,BIN 10100101,BIN 10111101,129,255
9020 DATA BIN 00111100,BIN 01000010,255,BIN 11100111,BIN 10100101,BIN 10111101,BIN 11000011,BIN 01111110
9025 DATA BIN 11011011,BIN 10011001,BIN 00111100,255,255,BIN 00111100,BIN 10011001,BIN 11011011
9030 RETURN
```

Rombug
by J McMorrough

Arcade Avenue

Cartoon art

By now all regular readers of PCW must be well and truly fed up with the debate raging on the letters page about the merits or otherwise of arcade high score tables. In fact, at times the argument has degenerated into the merits or otherwise of anyone who dares use their electronic marvels for arcade games.

Aside from the fact that everyone has a right to their own interests, and that games are one of the oldest and most necessary human pastimes, there are many arguments to support the computer games-player. For instance, all computer users benefit from the mass sales and low prices that are in a large part fuelled by an interest in games (and you only have to look at the specification of new low price machines such as the Spectravideo or the Flan Enterprise to see how games have influenced their design).

Similarly, games are the the most user friendly way of promoting computer awareness and an interest in programming. Hence the increase in sales of the myriad 'machine code made simple' books which suggest that the desire to write fast and furious games is producing in the public a degree of expertise that would once have only been found in the professionals.

People are learning that computers are not just malevolent leviathons that function only to add a row of spurious zeros to gas bills, and that they can improve our lives in undreamt of ways.

I think it is about time that we dispelled the misconception that computers should only have serious applications such as science, business or education — they should also complement the artistic side of life. American universities spend millions developing more and more complex graphics and animations systems. In the arcades we are already beginning to see games of a graphic complexity approaching that of cartoon movies that can interact with and respond to the skills and desires of the player. It may be an art form.

And now a request. What are the best versions of classic arcade games for your machine? Which *Pac Man*, *Defender*, *Buck Rogers*, *Dig Dug*, etc. would you advise your friends to buy? — let us know.

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to Tony Kendle, Arcade Avenue, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.


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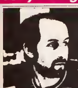
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Tony Bridge's Adventure Corner



Hollywood Trilogy

A couple of weeks ago I mentioned *Nosferatu* a Quill d adventure from author Graham Shaw He has contacted me to tell me that it is now being marketed by Classic Software which you ll find at 105 Church Lane Cross Gates Leeds LS15 8JD

The packaging, which I felt was an important part of the adventure and a facet of the game that lifted it well above the usual Spectrum adventure, has thankfully been retained *Nosferatu* is the first part of a trilogy the other parts of which are *The Connecticut Apple Affair* and *Guess Who s Coming To Dinner?* — sound like this should be called *The Hollywood Trilogy*! Each part will be self-contained, but on completion of the first two parts the player will be given a special code which will grant entry to a couple of special locations in the following program The second and third parts should be available any time now and if they re as good as *Nosferatu*, then I can recommend them

Graham makes some interesting comments in his letter In saying that there will be no help sheet available (though individual queries will be answered) he explains " this is because such sheets either seem to end up as step by step 'how to do it instructions (eg Artic s) or by making the player work for his clue end up being so cryptic that the unfortunate adventurer needs a help sheet for his help sheet!"

I think that help sheets can be an important aid to solving the adventure but Graham is right they have to tread a rather perilous middle path and can be more of a frustrating experience than the very adventure they re designed to help solve I hope to do a comparison of help sheets in the near future so if you have anything you d like to say about the subject, just drop a line to the Grand Elf

Graham goes on "10/10 for Mr Valentine s adventure ratings (Vol 3 No 11) — such lists will prove most useful! Here s a list of the adventures I ve encountered

SHIP OF DOOM — *ARTIC* (5 10) coming in for a lot of stick recently — not for feminists or lovers of children Often difficult but lacking in detail and depth

GOLDEN APPLE — *ARTIC* (7 10) the best of the Artic range — but beware the help sheet!

SNOWBALL — *LEVEL 9* (9 10) fiendishly logical but impossible to map If you find you can't progress take a tip from Ala ddin!

DUNGEON ADVENTURE — *LEVEL 9 (10/10) '6n '2"!!*

THE ISLAND — *CRYSTAL* (7/10) you'll love it or hate it. Packed full of gimmicks.

VELNOR S LAIR — *QUICKSILVA* (7 10) a pleasant surprise plenty of problems and plenty of monster bashing

MOUNTAINS OF KET — *INCENTIVE* (7/10) nice combat routine but try not to use it too often!

THE VALLEY — *ASP* (5/10) overpriced

MAGIC MOUNTAIN — *PHIPPS* (8 10) rather slow response time also some pictures take a long time to draw

"This list is for the Spectrum, although the Level 9 adventures seem to be available for every micro under the sun CBM 64 owners should lay their hands on a copy of *Twin Kingdom Valley* at all costs!! Incredible graphics!

Many of you have sent me lists of your favourite adventures, with ratings, and I think that this is a good idea — I can t even see, let alone complete all the adventures now available, and your lists are a good way of giving people an idea of difficulty value for money and so on One or two letters suggest a rating based on time taken to complete an adventure but I imagine everyone takes their own pace and while some people take two hours to finish *The Hobbit*, others are content to take it easy and fill several weeks I ll try and make a regular feature of such lists in the future if you keep sending them in

Victoria Dunne of North Shields has sent in some clues to some Spectrum adventures In a change from the usual Corner Code, I have included at the end of the Corner a list of relevant words If you are playing *Transylvanian Tower* 5-9-19 22-4-10 In *Planet of Death* 6-4-23-20 11-4-18-3-21-13 And finally in *The Hobbit* 14-7-17-11-7 24-9 2 16-26-15-6-12 25-28-1

Are you on Micronet 800? If so you ll be interested to know that several people have recommended *Orb of Orion* which you will find there Give it a whirl It s supposed to be rather hard!

Finally before I disappear down the hole I must ask everyone who has sent adventures to the Grand Elf to be patient — he has an awful lot to look at but every one is looked at! And I haven t forgotten you Mr Hugh T Walker I shall be going through your points soon

1	DOOR	15	KEY
2	GET	16	CACHE
3	ONE	17	SEQUENCE
4	THE	18	NOT
5	YOU	19	BUTTONS
6	PRESS	20	TWO
7	GOBLIN S	21	NEED
8	TO	22	LIFT
9	GO	23	DUNGEON
10	MIRROR	24	MOUNTAIN S
11	IN	25	CURIOUS
12	OPEN	26	TO
13	THREE	27	SIDE
14	BREAK		

This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further write to Tony Bridge Adventure Corner *Popular Computing Weekly* 12-13 Little Newport Street London WC2R 3LD

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PASSWORD ONLY

Adrian Hodge, 150 Greenock Road Largs Ayrshire writes

Q **I have a BBC model B. I write a lot of my own programs, and I would like to know how I can program the computer so that only I can get into the programs. For example, you would need a code or password. This has been puzzling me for quite some time – perhaps you could give me an answer.**

A One way of doing this would be to require a password to be entered before the program will properly start. This could be achieved by placing the following Basic statements at the beginning of your programs.

```
10 LET I=1 LET P$="ADRIAN"
LET P=6
20 LET A$=INKEY$
30 IF A$="" GO TO 20
40 IF A$<>MID$(P$,I,1) GO TO 10
50 IF I<6 LET I=I+1 GO TO 20
```

The string P$ is used to contain the required password, the length of which is contained in the variable P. Until the correct sequence of keys has been pressed the program will not proceed past line 50.

JOYSTICK CONVERSION

R Edwards, 29 Newbridge Road Port Talbot, West Glamorgan, writes

Q **I would like to know if there is an easy way of converting a Dragon 32 program that uses joysticks to use the keyboard instead.**

I have a specific program in mind and I have tried but with no success so far. The program has a line denoting two joysticks and I would like to convert it to use the arrow keys.

I would also like to know if anyone has given any thoughts on writing a book on the *Error* codes and the best way to get out of them. I mean the error codes that occur most often eg. *F/C Error O/D Error* and that sort. I'm sure that it would be a good seller.

A You will have to replace all the joystick statements with tests for the appropriate cursor keys. This may be a laborious process, but it is the only sure way.

You should bear in mind that a game designed specifically for joysticks is unlikely to be as easy to play using the keyboard. But, if you want to do this who am I to stop you.

One last point. You had better check that the keyboard hasn't been disabled (by a *Poke*) before you try all this. It is quite a common feature of joystick oriented games that the keyboard scanning routine is interrupted to speed things up.

CRYSTAL CLEAR

A Rayles 26 Ashleigh Road, Pontefract, West Yorkshire, writes

Q **I would like to know why the keyboard on my ZX81 locks up after around 10 minutes use. The screen display is terrible, as I hear is the norm, but after about 10 minutes the display goes crystal clear. When this happens the keyboard is disabled.**

Is this a general complaint with the machine and is it rectifiable? Could it be my tv set which is causing the trouble?

A Your problem lies with the ZX81 and not your tv. If you do not have a 16K Ram pack, then I am afraid that to repair it will necessitate some specialist repair work.

If you do have a 16K Ram pack then this is what you do. You will need to remove the internal 1K RAM chips. These are marked 2114 and there are two of them inside the ZX81.

If you don't fancy doing this yourself, then try a tv repair shop – they will be able to do this for you.

QL PRINTER

Stephen Grieff, 1 Chalfont Grove, Hastings Hill Sunderland writes

Q **I am thinking of buying a Sinclair QL for a small business, and I will need a good printer to go along with it. I will pay up to the £400-£500 mark for a printer. Please could you suggest some RS232-C based printers in this range?**

A There are quite a few printers in your price range, but I would tend to go for either an Epson RX-80 (dot matrix) or a Brother HR15 (daisywheel). The Epson retails at around £320 and the Brother at around £430.

ABOVE RAMTOP

L W Dewhurst, 8 Stirling Avenue, Leamington Spa, writes

Q **On page 157 of *Machine Code Applications for the ZX Spectrum* by David Laine, published by Sunshine, is the advice – "Assemble your code to run at high memory addresses, but leave enough room between the end of your code and the Spectrum UDG pointer location for the stack ... in general, you will be alright if the end of your code is at about 63500 with a 48K machine."**

But, I always thought that if one left machine code above Ramtop (reducing Ramtop is necessary beforehand) it would be out of reach of the stack – ie, that the stack would always be below Ramtop. Would you therefore please explain his advice?

A What I think David is getting at is the fact that you can relocate the stack in a machine code program (using the stack pointer) and that he is simply suggesting that you locate the stack at address 63500.

You must have noticed that quite a lot of commercially produced machine code programs use most of the Spectrum's Ram, implying that Ramtop has been reduced to a very low value. This would mean that there would be no room for the machine stack, unless the facility existed to relocate it somewhere else in memory (normally at the top).

BASIC PLOTTING

James Youngman, 86a Cat Hill Cockfosters, London, writes

Q **I would like to know whether *Xor (Eor)* plotting is possible in Basic on the QL as it is on the BBC B?**

A The easy answer to this is maybe. As you have no doubt heard, Sinclair have had a few problems fitting Superbasic into the QL Rom. Until the 'real' QL appears, I can only guess at what facilities will be finally available.

TRACK RACE

Mark Coltman, 42 Carlton Avenue, Kenton, Harrow, Middlesex, writes

Q **I've got a 16K expanded Vic 20, and I keep looking for a game which simulates a car on a track. I've got *Race Fun* by Rabbit Software, but it only shows one section of road at a time, also it doesn't go round corners.**

I'm looking for a game like *Chequered Flag* on the Spectrum. Have you seen any game of this description?

A The only car racing game I've seen is *Race* which is produced by Commodore at £4.99. I don't know of any others for the Vic, does anyone out there know different?

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Phil Rogers and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, PCW, 12-13 Little Newport Street, London WC2R 3LD.



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COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD or telephone 01-437 4343

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....

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FOR SALE an untouched Androids tape only £3 first come first served send money to — Church Farm House Bredfield Woodbridge Suffolk IP13 6AX, my name is James Giler

ELECTRON SOFTWARE for sale Twin Kingdom Valley Missile Control Mined Out Cybertron Moonbase Alpha, Birds Of Prey All £6 00 S.A.E. and cheque/PO to S N Naik House 60 Room 4 Manchester M8 8OS

FOR SALE Sharp Mz80K with Basic plus Basic extensions and assembly language Manuals and textbooks £280 ono Tel Birmingham (021) 355 1908

FOR SALE my collection of 130 games programs (listings) for the Spectrum £7 50 Tel Stevenage (0438) 811634 evenings

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Diary

Event	Venue	Dates	Admission	Organisers
Apple 84	Fulcrum Centre Slough	May 24-25 10.30am-5.30pm May 26 10.30am-4.30pm	£2.00 on door (free tickets in advance from organisers	Database Publications 68 Chester Road Hazel Grove Stockport 061-456 8383
North Wales Computer Fair	Memorial Hall Bodhyfryd Wrexham	May 26 10 00am-4 00pm	50p adults 25p children £1 00 family ticket	Wrexham & District Computer Club
Cetex (Consumer Electronics Trade Exhibition) (Trade only)	Earls Court	May 27 30 10 00am-7 00pm	Free	Montbuild Ltd 11 Manchester Sq London W1 01-486 1951
Software 84 (Trade only)	Earls Court London SW5	June 5-7 10 00am-6.00pm	£2 00 on door (free tickets in advance)	Reed Exhibitions Surrey House Throwley Way Sutton Surrey 01-643 8040
5th International Commodore Computer Show	Novotel Hammersmith London	June 7-8 10 00am-6.00pm June 9 9 00am 5 00pm	£2 00 adults £1 00 children £3 00 family ticket	Granard Communications 4 Bilmaes St, London SW1 01-930 6711
The Computer Fair	Hall D Earl's Court London	June 14 10 00am-6 00pm (trade and press only) June 15-16 10 00am-6 00pm June 17 10 00am-6 00pm	£3 00 adults £2 00 children & OAPs	Reed Exhibitions, Surrey House Throwley Way Sutton Surrey 01-643 8040

TEXAS INSTRUMENTS 994A complete with colour monitor cassette recorder £200 at T I module s-w inc Extended Basic new £450 + will sell for £200 00 Tel 061 301 2818 (day) 061 797 4702 (eves) (Mr Clynes)

Sharp PC1251 + C126 cassette printer Interface £95 ono Tel (0257) 481 706

EDTASM + assembler cartridge for Tandy colour computer 2 months old Includes user guide £25 Cost £40 Telephone (0632) 761031 after 6pm Bolton 28291 after 5 30pm

PRISM VTX 5000 modem for Spectrum Little used £70 Tel 0920 2623 (Ware)

FOR SALE 20 top selling 16 and 48K games for the Spectrum Top names like Ultimate Protek Imagine Melbourne Quicksilva and many more Worth £125 sell for £60 Studley 3720.

NASCOM 1 48K Ram B Eprom board, 8K Basic extended Basic tape enhanced Basic tape Nascom mags, software — Keys of Kraal Backgammon etc in steel case Tel Chippenham 657861

FOR SALE solutions to Scott Adams Adventure cartridges £1 Send money to Martin Wright, Alma Cilcennin Lampeter Dyfed Wales SA48 8RH with name, address and solution required Tel 0570 470362

STONKERS Mr Wimpy Jumbly Death Chase Pinball Wizard Thrusta Speed Duel River Rescue Brain Damage Rommel's Revenge Traxx Push Off etc for sale Phone 061 881 3961 Tony

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ORIC 48K CASSETTES for sale Chess Zodiac Oric Flight £3 each or 3 for £8 4 Loraine House, Acre Lane Wallington Surrey SM6 7NX



HEARD THE NEWS? MICROPOWER ARE ON THEIR WAY WITH COMMODORE 64 SOFTWARE!

New Releases

PLAY ON

Buffer Micro is to be congratulated for releasing a program which is long overdue — a music utility that utilises the various add on sound devices now available for the Spectrum

These peripherals almost all use the same sound chip and consequently only minor alterations are needed to use the program with Fuller sound box, *Zon*, *Zxm* etc.

Make Music allows you to use all three channels provided by the sound chip to create and store tunes and play them using the keyboard I suspect that in many ways the facilities on this program do not do full justice to all that's possible with the sound add-ons but nevertheless a most welcome release

Program	*Make Music*
Price	*£5 95*
Micro	*Spectrum (+sound add on)*
Supplier	*Buffer Micro 310 Streatham High Road London SW16 6HG*

SUPERIOR

Some of the better Dragon games have come from J Morrison Micros — although *Mission XK1* worried me from the first time I set eyes on the instructions Landing on large pad 50 points, middle pad 100 points' etc etc — this could only mean one thing (chill wind of realisation blows through the *Popular* citadel). *Lunar Lander!*

And *Lunar Lander* it proved to be, albeit with some extra features like a band of meteors that block the ascent and descent of the ship

So along with the left a bit, right a bit on the retros, you blast away at meteors hoping that the fuel doesn't run out Original it's not, but it is all in machine code and graphically it is much superior to most Dragon games

Program	*Mission XK1*
Price	*£6 95*
Micro	*Dragon*
Supplier	*J Morrison (Micros) 2 Glensdale Street Leeds LS9 9JJ*

ABOVE AVERAGE

Cricket buffs and players can now keep records of Cricket information on *Cricket Averages* by South Coast software

The program, which is basically a database, will store information on individual and team performance to be retrieved in a variety of ways — alphabetically, by scores, by catches, etc

The program, which is apparently actually used by Vic Isaacs of Hampshire County Cricket club, can also be saved to Microdrive for quick updating

Program	*Cricket Averages*
Price	*£4 95*
Micro	*Spectrum/BBC B/Electron*
Supplier	*South Coast 1 High Walk Fareham Hants PO15 6BS*

IT'S A GEM

Ruby Runabout is a graphic adventure for the 48K Spectrum from a new company, Scorpio software

It is not going to break any technical frontiers but is still pretty good fun in the *Knight's Quest* mould of difficult puzzles with neat little illustrations of some of the locations

Less noble than some previous adventures, you are the appallingly named Reggie the Ruby Robber and your quest objective is the steal the Rock-salmon Ruby and stash it away in your garage hideout

There are forty locations to explore and the whole thing is fairly jokey although not easy to solve The program can understand the usual range of verb noun combinations — probably good fun for novices

Program	*Ruby Runabout*
Price	*£6 95*
Micro	*Spectrum*
Supplier	*Scorpio Software 11 Fennel Street Manchester M4 3DU*

BOUNCING

Jet Power Jack is a multi screen arcade game for the BBC from Program Power — one of the most highly respected houses in the BBC field

Despite the name the game has little in common with the similar sounding Ultimate game Jack (is Jet Power his Christian name?) has to refuel various waiting starships

To get the requisite fuel pods he must cross various dangerous garages chock full of assorted nasty bouncing, jumping, lurking and zooming bad dies

There is a time limit in the form of Jack's dwingling oxygen supply and additional problems such as Jack's Turbopac which behaves somewhat erratically Colourful and addictive, with great graphics.

Program	*Jet Power Jack*
Price	*£7 95*
Micro	BBC B
Supplier	*Micro Power Northwood House North Street Leeds LS7 2AA*

SHUFFLER



Bridge programs are emerging from the woodwork — presumably because I said there weren't many of them a few weeks back Oh well

Contract Bridge is for the Atmos and seems to have the same features as other versions on the market — the computer bids, shuffles deals and plays out its hand

Program	*Contract Bridge*
Price	*£5 00*
Micro	*Atmos*
Supplier	*Touchstone 61 Highfield Road Saxilby Lincoln*

CABBAGES

Revenge of the Killer Tomatoes is an arcade game presumably inspired by the classic film *Attack of the Killer Tomatoes* which featured the amazing couplet 'how I'm gonna miss her, a tomato ate my sister'

The idea of the game is to avoid rows of cabbages and roving vegetables whilst trying to remove stray weeds Colliding with cabbages merely loses you points but touching other vegetables results in instant destruction

There are inevitably for a Spectrum game sprite

graphics and even good sound effects and on the whole the game is quite fun — ridiculously simple though, and I would take the blurb on the back which says 32 on-screen sprites with a pinch of salt — most of them seem to be cabbages

Program	*Revenge of the Killer Tomatoes*
Price	*£5 95*
Micro	*Spectrum*
Supplier	*Visions* *1 Felgate Mews* *Studland Street* *London W6 9JT*

COMMITMENT

Magra has been pretty angry for a long time now but at last her wrath can be engaged to the full — *The Wrath of Magra* has been released

To call it Epic is not enough, for £14 95 you get 120K of program and around 200 pages of book plus some game notes in a neat little booklet The booklet opens with the classic understatement 'hope you get many hours of enjoyment' Hours? — We're talking about years here

Wrath of Magra is going to need commitment, the 200 page book sets various scenes to the action and explains why it is that you, lone adventurer, must set out your vast journey to kill the witch Magra and release princess Edora from eternal incarceration.

After a few pages I found the sub Tolkien style of the book a bit trying but full marks to Carnell for trying to bring a sense of atmosphere to the game — an often unappreciated but important ingradient to adventures

The game itself well something bad first — response times are slow and simple commands take ages to be acted our — as I say you'll need commitment not to start throwing things at the computer

On the other hand playing Magra is like playing almost every other adventure at once, not only are there amazingly difficult conundrums and puzzles, but there are illustrations of every location, complex sentence analysis, a large vocabulary, various considerations affecting your combat, ability to cast spells, tiredness, hunger etc etc

Some sections feature hi-res monsters others enable you to buy and sell goods, sometimes you will need a map, mostly you will need a lot of help If, generally speaking, you like Tolkien, Dungeons and Dragons, hard text adventures and marijuana you will go gaga over the *Wrath of Magra* — the rest of us will think it's pretty good too

Program	*The Wrath of Magra*
Price	*£12 50*
Micro	*Spectrum*
Supplier	*Carnell Software* *North Weylands* *Industrial Estate* *Molesey Road* *Hersham* *Surrey KT12 3PL*



WILD AND WOOLLY

A new Llamasoft game can always be sure of an extensive evaluation in the *PCW* office and *Sheep in Space*, for the Commodore 64 had a longer evaluation than most.

The objective of the game is to defend the planet (using a flying sheep) against various energy stealing aliens The baddies can obliterate the planet by building up charge on the giant planet busters Should a planet get destroyed then the sheep must venture out into space and kill off baddies in vengeance

The sheep is equipped (aside from the ability to fly) with glowing bonios which wipe out all they come into contact with Problems occur because the screen features two grounds — one at the top of the screen and another at the bottom — thus two separate gravities work on your bonios pulling them both upwards and downwards depending on where you are (if you see what I mean)

From time to time, the sheep will get hungry and will need to graze this involves landing it on a green field — have you ever tried to land a sheep? Obviously it's wonderful — any game with flying sheep in it would have to be



Program	*Sheep in Space*
Price	*£7 50*
Micro	*Commodore 64*
Supplier	*Llamasoft* *49 Mount Pleasant* *Hants RG26 69N*

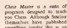
IN THE GROTTO

One consonant does not a different game make and whichever way you look at it, *Skramble* is *Scramble*

Scramble was a very popular arcade game in which you piloted a ship through ever narrowing caverns past a variety of baddies through to an enemy base dozens of screens and thousands of failed attempts later *Skramble* is exactly the same and is for the Commodre 64

However, the game has the great virtue of being a very addictive concept to begin with, and by adding Commodore 64 graphics and sound to it you can hardly go wrong Credit too, for selling the program at £5 99 which is at least a pound cheaper than the norm for such Commodore programs

Program	*Skramble*
Price	*£5 99*
Micro	*Commodore 64*
Supplier	*Rabbit Software* *The Warren* *Unit 11* *Forward Drive* *Wealdstone* *Middlesex HA3 8NU*



IN DEPTH

Chess Master is a suite of programs designed to teach you Chess Although Sinclair themselves have published something similar this is an



altogether more substantial package

Chess Master consists of one program tape containing a variety of Chess positions and two Commentary tapes in which Chess Grandmaster Tony Miles talks you over what moves you should make and why

The discussions are fairly detailed with the roles of the main fighting pieces analysed in great depth It's a bit cumbersome having to switch about from commentary tapes to program tapes and vice versa but if you are a chess novice and you stick with it, I think this package could be very useful indeed

Program	*Chessmaster*
Price	*£15 95*
Micro	*Spectrum*
Supplier	*Serin Software* *PO Box 163* *Slough* *SL2 3YV*

New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases, Popular Computing Weekly, 12 13 Little Newport Street, WC2R 3LD



Top 10

BBC*
1 (1) Aviator (Acornsoft)
2 (2) Spooks and Spiders (Software Shadow)
3 (8) Snooker (Visions)
4 (–) Battle Tank (Superior)
5 (7) Fortress (Pace)
6 (–) Stagger (Alligata)
7 (9) Football Manager (Addictive Games)
8 (–) Forth (Acornsoft)
9 (–) JCB Digger (Acornsoft)
10 (–) French (Acornsoft)
*All model B
(Figures compiled by Micro Management Ipswich (0473) 59181)

Atari
1 (1) Solo Flight (Microprose)†
2 (7) Rally Speedway (Adventure International)
3 (6) Zaxxon (Datasoft)
4 (3) Warlock (Calisto)
5 (–) O'Riley's Mine (Datasoft)
6 (–) Earthquake 1906 (Adventure International)
7 (5) Pooyan (Datasoft)
8 (–) Slinky (Cosmi)
9 (–) Caverns of Kafka (Cosmi)
10 (–) Aroid (Calisto)
*Cartridge †32K cassette
(Figures compiled by Calisto Computers, Birmingham 021 632 Atari)

ZX81*
1 (1) Krazy Kong (PSS)
2 (–) Fantasy Games (Psion)
3 (3) Mothership (Softsync)
4 (7) Flight Simulation (Psion)
5 (2) Scramble (Quicksilva)
6 (4) Chess (Psion)
7 (–) 1K Chess (Artic)†
8 (5) Space Raiders (Psion)
9 (8) Defender (Quicksilva)
10 (–) Black Crystal (Carnell)
10 (10) Gnasher (Quicksilva)
10 (–) Vu-file (Psion)
*All 16K except where indicated
Three titles tied for 10th position
Figures compiled by Boots/Websters

Vic 20
1 (–) Wizard and the Princess (Melbourne House)
2 (9) Submarine Commander (Thorn EMI)
3 (–) Duckshoot (Mastertronic)
4 (7) Snooker (Visions)
5 (6) Tower of Evil (Thorn EMI)
6 (4) Tank Commander (Thorn EMI)
7 (1) Krazy Kong (Interceptor)
8 (3) Metagalactic Llamas (Llamasoft)
9 (5) Jet Pac (Ultimate)
10 (10) Mine Madness (Thorn EMI)
Figures compiled by Boots/Websters

Commodore 64
1 (1) Manic Miner (Software Projects)
2 (–) Practifile (Marketing Micro)*
3 (–) Inventory 64 (Marketing Micro)*
4 (–) Practicalc (Marketing Micro)
5 (8) Space Pilot (Anirog)
6 (6) Black Hawk (Thorn EMI)
7 (–) BMX Racers (Mastertronic)
8 (5) Pedro (Imagine)
9 (–) Space Walk (Mastertronic)
10 (–) Practicalc (Marketing Micro)
*Disc
Figures compiled by Boots/Websters

Dragon
1 (–) Chuckie Egg (A&F)
2 (–) Hungry Horace (Melbourne House)
3 (–) Eightball (Microdeal)
4 (3) Ugh! (Softek)
5 (9) Up Periscope! (Beyond)
6 (2) Pedro (Imagine)
7 (2) Krazyglobal (Beyond)
8 (–) Trigger (Microdeal)
9 (7) Space Shuttle Simulator (Microdeal)
10 (–) Cuthbert in Space (Microdeal)
Figures compiled by Boots/Websters

Spectrum*
1 (2) Jet Set Willy (Software Projects)
2 (1) Atic Atac (Ultimate)
3 (3) Chequered Flag (Psion)
4 (9) Hunchback (Ocean)
5 (6) Flight Simulation (Psion)
6 (4) Scuba Dive (Durrell)
7 (7) Pogo (Ocean)
8 (9) Cyrus IS Chess (Intelligent)†
9 (8) Lunar Jetman (Ultimate)
10 (–) Alchemist (Imagine)
*All 48K except where noted. † 16K
(Figures compiled by WH Smith and Son, London)

Books
1 (–) Spectrum Hardware Manual, *Dickens* (Melbourne House)
2 (–) 60 Games and Applications for the ZX Spectrum, *Harwood* (Interface)
3 (–) Spectrum ROM Disassembly, *Logan* (Melbourne House)
4 (–) Spectrum Machine Code, *Stewart and Jones* (Shiva)
5 (3) Commodore 64 Games Book, *Bishop* (Granada)
6 (1) Creepy Computer Games *Erskine et al.* (Osborne)
7 (–) 100 Programs for the Spectrum *McClean and Gordon* (Prentice Hall)
8 (–) 60 Programs for the Sinclair Spectrum, *Erskine et al.* (Pan)
9 (10) 60 Programs for the Vic 20 *Erskine et al* (Pan)
10 (–) Spectrum Book of Games, *James and Gee* (Granada)
Figures compiled by Bookwise

Book Ends

MAGIC

A neat looking book for younger children is *Spectrum Magic* from Foulsham. It is intended for the complete beginner starting off with leads and where to plug them and moving step by step to fairly full basic programming.

The book is well designed with clear pictures and diagrams and large unequivocal type. For really basic information I think it is one of the best such books I have seen.

Book	*Spectrum Magic*
Price	*£4.95*
Micro	*Spectrum*
Supplier	*W Foulsham & Co, Yeovil Road, Slough, Berkshire, SL1 4JH*

HAUNTED

Write your own Adventure Programs is a glossy hardback book that retails for a mere £4.50. Like many similar books, it takes you through the main elements involved in Adventure writing by actually developing an adventure called Haunted House.

The listings for the adventure are annotated so that the adventure can be run on any popular micro and whilst the whole thing may not appeal to more earnest adventurers, kids will love it.

Book	*Write your own Adventures*
Price	*£4.50*
Micro	*General*
Supplier	*Usborne Publishing, 20 Garrick Street, London WC2E 9BJ*

COMMANDS

In the same way that there are quite a few people who bought books on the Spectrum Microdrive without having seen one, so some people will be interested in the *IBM PCjr Buyer and User Guide*.

It's actually a very good book detailing the peripherals, commands, keyboard, interfacing, use of disc drive, Basic, publications, etc for the IBM machine. It's the kind of information that is very useful to have all in one place and it could actually be worth buying even if you are only (when it becomes available) thinking of buying the Jr.

Book	*IBM PCjr Buyer and User Guide*
Price	*£8.95*
Micro	*IBM PCjr*
Supplier	*Prentice Hall, 66 Wood Lane End, Hemel Hempstead, Herts HP2 4RG*

This Week

Program	*Type*	*Micro*	*Price*	*Supplier*
Staircase Stampede	Arc	BBC	£7.50	Comsoft
Castle Assault	Arc	BBC B	£5.70	MRM
Chiloe Play	Ed	BBC B	£8.95	Dial
Childsplay	Ed	BBC B	£9.95	Polarsoft
Derte	Arc	BBC B	£5.70	MRM
Monsters & Magic	Ad	BBC B	£6.95	ISP
Screwball	Arc	BBC B	£5.70	MRM
Spellwell	Ed	BBC B	£6.95	Bal
Attack on Windscale	Ad	Commodore 64	£9.95	Phoenix
Bath Time	Arc	Commodore 64	£7.95	PSS
House of Asher	Arc	Commodore 64	£5.95	Anirog
Ice Hunter	Arc	Commodore 64	£6.95	Anirog
Petch	Arc	Commodore 64	£6.95	Anirog
Pinball Wizard	Arc	Commodore 64	£8.95	CP
Spider and the Fly	Arc	Commodore 64	£7.95	Interceptor
The Electron Game	S	Commodore 64	£1.95	Mastertronic
Wallie goes to Rhymeland	Arc	Commodore 64	£7.95	Interceptor
Chemistry Test One	Ed	Dragon	£1.50	P.A. Perris
Chess II	S	Oric	£5.95	Tansoft
Airbase Invaders	Arc	Spectrum	£5.95	CP
Antics	Arc	Spectrum	£5.95	Bug Byte
Character Designer	Ut	Spectrum	£9.95	ISP
Computer Cook Book	Ut	Spectrum	£6.95	Bug Byte
Friendly Face	Ut	Spectrum	£5.95	Monitor
Hover + Paste	Arc	Spectrum	£6.95	Delfersoft
Lords of Midnight	Ad	Spectrum	£9.95	Beyond
Manor of Madness	Spec	Spectrum	£3.95	Celtic
Message from Andromeda	Ad	Spectrum	£7.95	Interceptor
Matrifile	Ut	Spectrum	£9.95	ISP
Operation Roman Gaul	Ad	Spectrum	£5.95	Spearsoft
Screen Machine	Ut	Spectrum	£6.95	ISP
Spectrum Sprites	Ut	Spectrum	£7.95	ISP
Tank Attack	Arc	Spectrum	£1.99	Mastertronic
The Inferno	Ad	Spectrum	£6.95	Richard Shepherd
The Pit	Arc	Vic 20	£7.95	Interceptor
Climber	Arc	ZX81	£3.95	Unicorn

Key: **Ad** — adventure/**Arc** — arcade/**Ed** — education/ **S** — strategy-simulation/**Ut** — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD



What is Life?

I had a twinge of nostalgia when *Life* was mentioned again in a recent *Popular Computing Weekly*. Several national debts worth of computer time must have been wasted by this "solitaire game" quite a bit of it by me — I still have smug memories of running it in Fortran at the Oxford University Nuclear Physics Dept and the Atomic Weapons Research Establishment, to name but two. Younger computer addicts, though, may be gaping blankly and asking the very philosophical question "What is *Life*?"

It was invented in the late sixties by John Horton Conway, the celebrated Cambridge mathematician; the *Life* boom got under way when Martin Gardner made it the subject of a 1970 "Mathematical Games" column in *Scientific American*. More columns followed, and now at last the revised and expanded facts of *Life* are available in Gardner's latest excellent collection of his own columns. *Wheels, Life and Other Mathematical Amusements* is published by W H Freeman & Co at £13.95, contains 19 other pieces besides the three on *Life*, and is strongly recommended to seekers after truth. This publication puts an end to the need to ferret through dusty heaps of old magazines.

Life isn't a game in the usual sense. Conway himself has called it a no-player game. The idea is enticingly simple. You have a big two-dimensional array like an infinite chessboard; each square is called a cell, and touches eight others (if you don't believe me, get out your infinite chessboard and count). To begin with, each cell is either full or empty — the starting pattern is up to you. Then the rules of *Life* take over.

If a full cell has two or three full cells touching it, it survives to the next "generation". A full cell dies from exposure if none or only one of the touching cells is full — it also dies from overcrowding if more than three of the touching cells are full. Either way, it becomes an empty cell for the next generation. Finally birth happens in an empty cell when it has exactly three full cells touching it, in which case (you guessed) the empty cell becomes full.

A nice example is a row of three full cells. In the next generation the two end cells die of exposure, but at the same time there are two births on either side of the centre cell — a horizontal row of three becomes a vertical one. This pattern is called a blinker; it oscillates forever from horizontal to vertical and back again as the generations go by.

Sounds trivial and boring? The interesting thing is that Conway's simple rules can generate bogglingly complex patterns from humble beginnings. Watching them change generation by generation on the computer display, you can see movement, evolution, even savage conflict. There are *Life* patterns which crawl about the array, or gobble other patterns with fatal ones and revolting table manners. Gardner's book has a useful catalogue of the simpler *Life*-forms.

People who watch the movement and evolution of *Life* patterns can get funny ideas, such as that maybe the laws of our universe could at root be as simple and arbitrary as Conway's. Could a *Life* configuration be intelligent? SF author Piers Anthony had a go at this question in his (alas not very good) book *OX*, to the confusion of readers not familiar with the game. Conway and others asked a less cosmic but more answerable question: could a *Life* pattern function as the next best thing to intelligence, ie a universal computer?

The answer is yes. A chapter in *Winning Ways* by Berlekamp, Conway and Guy (Academic Press, very expensive) shows how to construct a computer using the simplest moving *Life* patterns as bits: a computer capable of any mathematical task.

As a "thought experiment", this bursts the brain with the information that absolutely any mathematical problem can be reduced to the question of whether a particular *Life* pattern will or won't eventually vanish completely from the array.

So next time you see someone gawping at peculiar patterns writhing and changing on their ZX81 monitor, do not scoff. It could just be a serious mathematical quest for the answer to *Life*, the universe and everything.

David Langford

That's my number!

Puzzle No 108

There was a great deal of celebration (including much bopping about) when the eleven members of the syndicate found that they had won just over a million dollars in the national lottery.

Naturally there was extensive press coverage, with pictures of the group showering themselves with champagne and it was remarked that the sum on the cheque — in dollars and cents — contained no two digits alike.

Also, curiously, when the money was shared out equally there was an exact division.

How much was the total prize money?

Solution to Puzzle No 103

The program tests all possible four-digit numbers to see which has a reverse exactly four times as large. As this number has to be less than 833 only these numbers need to be tested.

```
10 FOR N = 1 TO 833 20 LET N$ = STR$(N) 30 IF N < 10 THEN LET N$ = "000" + N$ 40 IF N > 9 AND N < 100 THEN LET N$ = "00" + N$ 50 IF N > 99 AND N < 1000 THEN LET N$ = "0" + N$ 60 M$ = "" 70 FOR F = 1 TO LEN(N$) 80 M$ = MID$(N$,F,1)+M$ 90 NEXT F 100 IF VAL(N$)*12 = VAL (M$) THEN PRINT N$,M$ 110 NEXT N
```

This gives the only possible result: 0495*12 = 5940. Cyndy still has to remember which number goes with which look, though.

Winner of Puzzle No 103

The winner is Gary Henderson, Ambra Vale West, Clifton Wood, Bristol, who receives £10.

Rules

If the puzzle can be sensibly solved using a computer then the winner will have included a listing of the program used to find the correct answer. The closing date for entries to Puzzle No 108 is June 8.

The Hackers





